

TECHNOLOGY DEPT.

The

TOOL ENGINEER

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~~THE AMERICAN SOCIETY OF TOOL ENGINEERS~~

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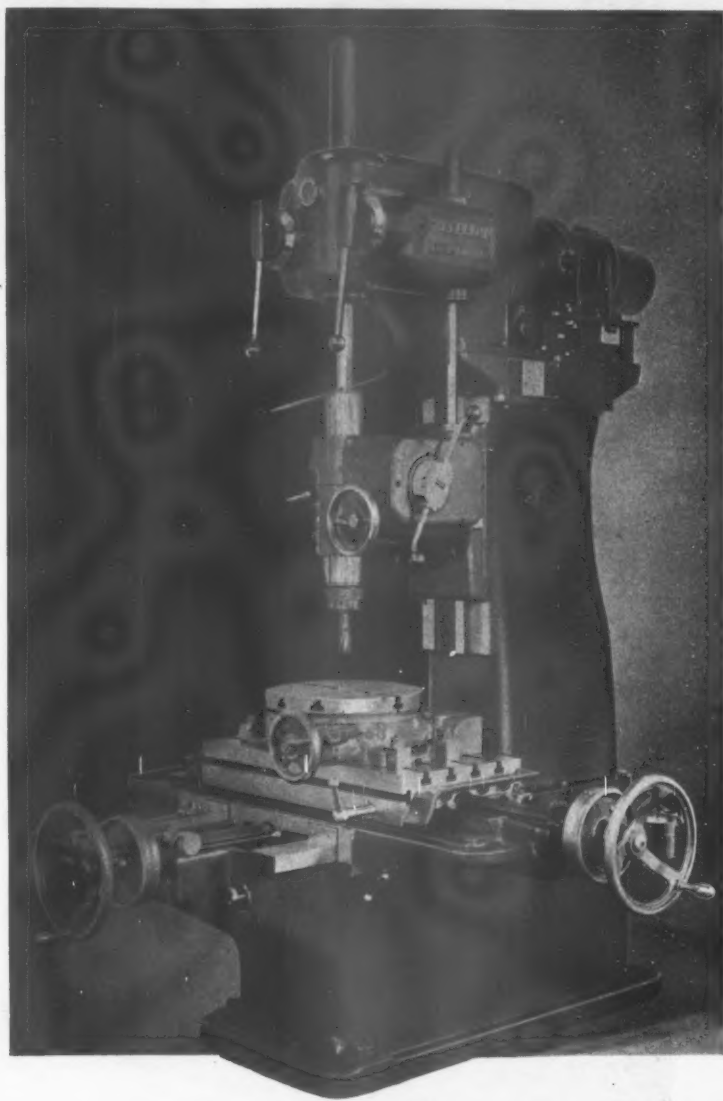
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**JANUARY
1938**

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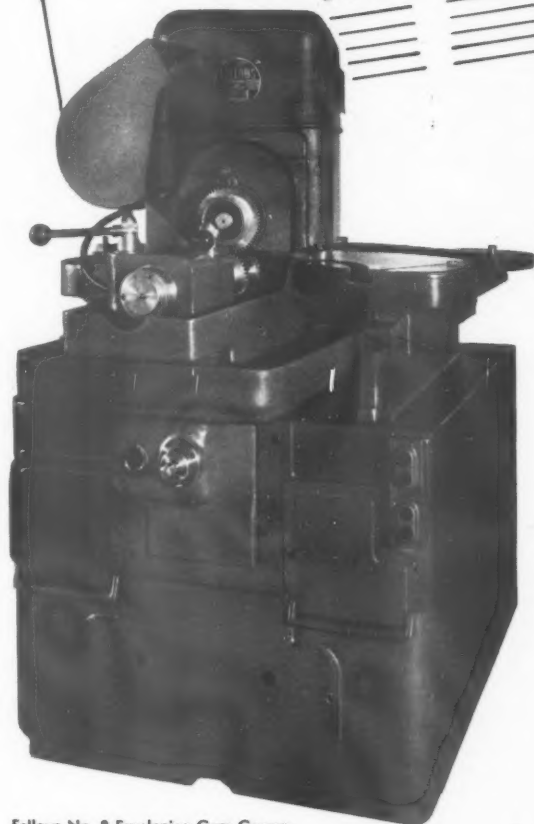
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THE BIG NEWS OF 1938

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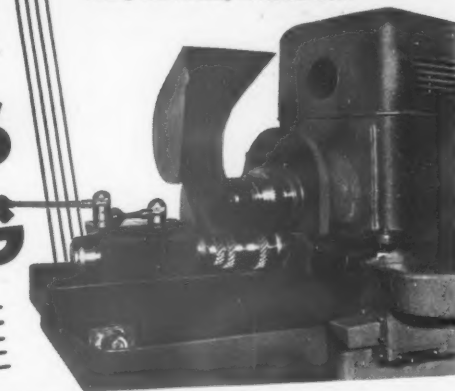
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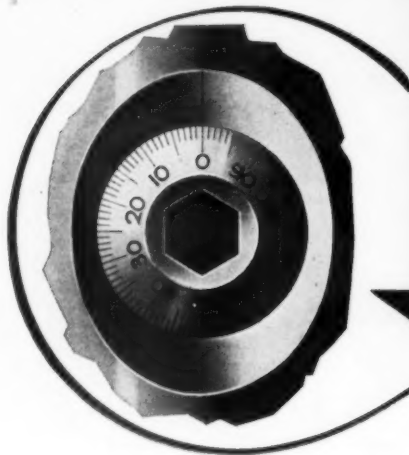
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




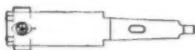
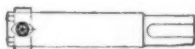
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The Tool Engineer

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Official Publication of the AMERICAN SOCIETY OF TOOL ENGINEERS

Vol. VI

JANUARY, 1938

No. 9

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Owing to the nature of the American Society of Tool Engineers, a technical organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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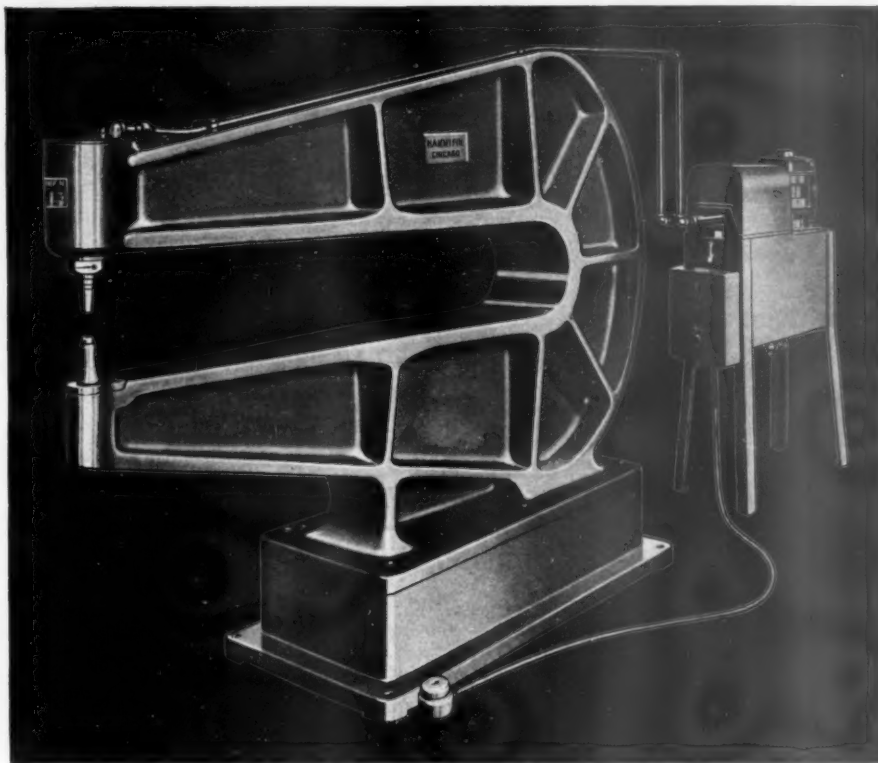
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THE TOOL ENGINEER FOR JANUARY, 1938

● BIG and FAST

This "Hy-Power"
hydraulic riveter
with 12 inch
frame opening
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reach heads
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cycle



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EDITORIALS

By
A. E. Rylander

The Tool Show

AT FIRST IMPRESS, the A.S.T.E. Machine and Tool Progress Exhibition, tentatively broached in the previous issue and formally announced in this number, may strike one as an adventure of Youth, a venture for the courageous. And, it is that, for the American Society of Tool Engineers is a young organization, ambitious, progressive, yet conservative in its liberalism.

Conceived in the darkest days of the past depression, The Society grew and thrived in the face of adversity, opened a new and vast field in engineering. Daring new things, it gained recognition, became an important factor in the industrial progress of the nation, lent impetus to Recovery. Today, it is the cynosure of engineering eyes, the fastest growing and most progressive engineering society in the world.

Youth alone, as reckoned in years, did not do all this. But youth, as typified in fresh vision and receptiveness to new ideas, fostered a new experiment, established new traditions. And men with vision, from students and junior draftsmen to major executives, rallied to its standards, augmented its ranks, helped to dot the country with new Chapters. Engineers from far lands vision it as an international Society.

It may be assumed, then, that in launching so ambitious a program as the A.S.T.E. Machine and Tool Progress Exhibition, the American Society of Tool Engineers will put it across, will make it one of the outstanding industrial expositions of the day. Many indications augur a huge success. The Exhibition has been well considered, carefully planned. Manufacturers and vendors may exhibit knowing that the cream of tool and equipment buyers will inspect their wares, will be spurred to buy by sheer force of necessity. Then, too, the Exhibition will be right in the center of the vast automotive industry, and engineers from all over the land are planning a sortie on Detroit March 9th, 10th, 11th and 12th. The same forces that led us out of a world depression now convene to snap us out of a recession, with the American Society of Tool Engineers setting the stage for Progress.

The time is auspicious. Right now, exports are rising, proving that foreign markets are sound; we know that agriculture is on a stable basis, affording a vast potential domestic market, we know that, before the show opens, reduced inventories will necessitate re-stocking of raw and finished materials. Also, we have the prospect of a vast Federal housing project, designed to employ a legion long idle; that, with re-employment by industry, launches a new era of Prosperity. The A.S.T.E. Machine and Tool Progress Exhibition heralds that era.

Education Necessary

EVER SINCE this Age of Invention begot new ways of doing old things better and faster, and evolved new things for the benefit of mankind, all at costs that encourage mass buying, sinister forces—of prejudice and ignorance—have combined to rear a wall of resistance against new ideas and improved methods of production. Yet, the history of invention attests that the most of such new methods have lightened the load of labor, have been potent factors in raising standards of living.

To state these truths is to go over old ground, yet, only by repetition can these truths prevail. And prevail they must, lest we have retrogression. Ignorance (and selfish interests that are not ignorant, but prey on the ignorant) charge that improved equipment displaces men, creates unemployment. We can agree that new tools, new equipment, new methods displace men; to deny that is to deny an axiom. That is what the innovations are designed for. But, they do not create unemployment; if they did, it were far better for the world were they never conceived.

The fact is, however, that for every worker displaced by new methods, many have been employed making the new devices. The result has been, not to curtail employment but to promote it, to found new and often vast industries. Without new ideas, mass production and its tools, we would still be in the horse and buggy days, each community remote by itself in comparative isolation. And, perhaps, happier than now, unless suffering occurs. When flood, famine and epidemics strike, then modern communication is a godsend.

As engineers, we must refute a propaganda of untruth with the truth, must educate the masses to the value of new invention. Not only for our own economic salvation, but for that of the world. We can show that the typewriter, displacing a few scribes, the iceless refrigerator, displacing comparatively small seasonal groups, each provided employment for untold thousands, and so on, ad infinitum. Let us, from now on, unite ourselves into a school of thought to encourage invention, that Progress may go on.

MEN AND MATERIALS

By

A. E. Rylander

Member A.S.T.E.
Efficiency Engineer
Midland Steel Products Corporation

TECHNICAL EDITOR
FOR THIS ISSUE

MILLENNIA BEFORE THE AGE of mass production, materials handling was a problem. The building of Solomon's temple entailed methods of handling, as did the hanging gardens of Babylon. One may assume that the building of the Pyramids (old before Moses led the Exodus), taxed the ingenuity of the Egyptian engineers assigned to their construction. For, not only was the material brought from remote points, but each stone in the structure weighed many tons, had to be lifted in place. Of course, those engineers had unlimited man power at their command, and life was cheap in those days. But even so, there is a limit to human strength, regardless of how one may multiply it; just so many men and no more can get under a block of stone. The assumption is, then, that the Egyptians had evolved mechanical means of material handling, took advantage of them. How, opens an intriguing train of conjecture.

Even among the highly socialized insects, as the ants and bees, materials handling is not so much a problem as a matter of existence. The methods were established eons ago, remain changeless. It is interesting, however, to note that socialized classes in the insect and animal world—beavers among the latter—share with man the trait of storing food, providing storage depots for its keeping and the building of more or less permanent homes. The difference is that man is not a highly social animal by instinct but because of expediency. As the family evolved into the clan, the clan into the tribe, the tribe into the nation, each stage in the social evolution of man entailed its problems of feeding, housing and comforts. Large cities also created problems of transportation. In past times, these were resolved by letting the masses walk while the rich and near rich rode; today, the masses are moved by mechanical means—usually in the same vehicles that transport the rich.

In materials handling, time and place determine the method. Goods have been transported by water for ages, while the caravans of the ancients still plod across deserts, lately supplemented by rail and motor transport. In the Rockies of North America burros move machinery to the mines, carry away the ore, in the

Andes, llamas (more temperamental by far than the patient donkey) act as animated conveyor lines. Where terrain and waterways permit, however, goods are moved by train, truck and ship, the crisscrossing lines weaving an international web of commerce and trade. It all comes under the head of materials handling.

This thesis, however, is concerned with materials handling in industry; I have merely sketched a general picture showing that transport of goods is not a modern phase, that materials handling, like most things, is nothing new. It just happens that the demands of mass production have educed some very interesting and highly specialized methods, several of which are presented in this issue by specialists. A number of papers had to be omitted because they were competitive; the means were similar, differing only in design.

Now, mass production depends not so much on one line of equipment as on many, and the many must be coordinated to function as a unit. The parent equipment of mass manufacture is the machine tool, which cannot only reproduce itself, but, by combination, can be made to produce any specialized machine or tool. As offspring, we have broaching machines and presses, swaging machines and headers, rolling mills and rubber mills, braid-ers and textile machinery, turret and screw machines, and so on through the entire gamut of industrial equipment. All of this equipment, by the way, has its origin in the fertile brains of creative engineers.

Few if any machines can function to best advantage without tools, that is why Tool Engineering is so important a phase of mass manufacture. Given the machines, Tool Engineers can devise tools or combinations of tools to produce anything within the possibilities of the equipment, and often beyond the scope conceived by the maker. But, it is not enough to produce the goods;

raw or semi-finished material must be brought to the machine, then moved to the next stage of processing, finally to the shipping department. Various expedients are resorted to that this movement progress in an orderly manner.

For heavy work, as in steel mills and foundries, cranes remain the reliable standby. These have the advantage that they can pick up a cradle of stock from the middle of interferences, can move it anywhere within the range of longitudinal and traverse travel and as conveniently drop it at any spot designated. More flexible, and designed for lighter but comparatively heavy loads, the overhead single rail system can move material almost anywhere within a building and as far away from it as the system may extend. It is assumed that it is confined to property lines; this, however, is not arbitrary. While I haven't seen such a system, personally, there is no reason why finished goods could not be moved by such overhead system from shipping room to an adjacent or nearby transport terminal. Certainly, industry has not taken full advantage of the fact that this system affords an ideal means for moving goods from one building to another, without the hazards entailed by trucks which, when crossing streets, may collide with other vehicular traffic.

The overhead tramrail also lends itself readily to assembly lines, as in the assembly of automobile frames. In combination with chain conveyors, as in spray booths and drying ovens, the tramrail system may be timed, the time extended by turn and return, by elevation and descent. This combination also permits moving goods from one floor to another, from a high level to a lower, as when fenders, wheels, units and bodies are delivered to floor assembly lines in the automotive industry. Many who have watched a gray car being assembled in a line composed mainly of black ones, and have seen each correlated unit drop into the right place at just the right time, have marvelled at the coordination effected by production engineers.

Then, we have belt conveyors, also very flexible and on the whole cleaner and quieter than chain or roller conveyors. The writer recalls

(Continued on Page 32)

Single Rail Application Important Factor in Automotive Industry

By

C. M. Drake

Engineer, Cleveland Tramrail Division

Chas. A. Strelinger Company

Detroit, Michigan

THE HANDLING OF BULKY material is no longer considered an expensive, hazardous operation since the development of specialized material handling equipment and the adaptation of suitable hoists and special grabs.

Tramrail is now used in nearly all major handling problems in the automobile industry. In the foundries, some of the most recent applications consist of handling cores on core racks which are baked in core ovens at temperatures of 450°F. The wheels of the carriers are specially designed for oven temperatures, the bearings in which are not affected by the heat. After the cores are baked, they are transferred to the molds. The molds are assembled in two halves and, by means of special jib cranes and electric hoists, are set on the mold conveyor. The closing of the molds is a very particular operation and special variable speed electric hoists are used for this purpose.

After the molds are placed in the mold conveyor, they are transferred to the pouring station where the hot metal is either brought direct from the cupolas or handled on pouring loops and poured into the molds. Suitable time is allowed for the casting to set and then the molds are knocked apart and the casting is handled to the shake-out. From there it is placed on a cooling conveyor and, after a slow cooling process, arrives at the Cleaning Department where it is taken off and either sand blasted or tumblasted.

Heavy castings are placed on belt conveyors where they pass under swing grinders mounted on special cranes that are so sensitive that the mere pressure of the grinder on the casting causes the crane to travel at the same speed as the conveyor. Castings are then stored for future use. In the Machine Shop, castings are taken from storage and placed on special conveyors where they are transferred to heavy duty machines.

Crank shafts, which are very dif-



Rear axle and spring assembly is transferred from an assembly-buck conveyor to frame assembly conveyor by means of single rail carriers with chain hoists. When axle has been mounted on to frame, carriers are returned to original position with little effort.

ficult to handle, due to shape and weight, are placed on racks and the racks passed from one machine to another until the complete machining is finished. Other similar bulky material is handled to grinders, boring machines, lathes, etc. on overhead track or cranes.

The protection of metal from corrosion is one of the latest developments and material is conveyed through the various processes. The method used varies somewhat with the nature of the material but, in all cases, safety of operation is one of the chief factors in selecting the proper equipment.

In the manufacture of bodies, the overhead material handling equipment has played an important part with the adoption of all-steel bodies. Pincher welders and resistance units are suspended from "Easy Roll" cranes which travel with the conveyor or over bull rings, allowing the operator to concentrate on the welding without thought to the equipment he is using. Special assembly fixtures are designed and all major parts are securely clamped so that practically the whole body is made with one flash. The body is then taken from the fixture with special pneumatic cranes and placed on assembly conveyors.

In steel mills, the rod is handled in storage by means of a special double hoisting carrier operated by a man in a cab who is capable of

taking eight 400-lb. coils of rod and storing them in specially designed storage bins and also reclaiming them without the aid of a hook-on man. Pickling of rod is accomplished by special Gantry double hook pickling cranes which operate in the Cleaning House Department. After the rod has been pickled, it is taken to the Drawing Department where specially designed block stripping cranes handle the rod from drawing blocks to straighteners.

In glass plants, glass is efficiently stored and handled to the polishers. In making wire harness for ignition, after the wires are assembled, they are placed on special racks and lowered, by means of a special drop section, into a solution which protects the wires from being affected by water, oil or heat. In the Paint Department, paint is handled to the mixers by means of specially designed cranes and hoists. Due to the latest method of painting, special polishing and buffing machines are suspended along the hood and fender polishing bucks, permitting the operator to produce the desired finish.

In the Motor Assembly Department, cylinder blocks are taken from the cylinder block assembly conveyor and transferred to motor assembly conveyor where the various parts are assembled. Heavy parts, such as crank shafts, are placed in the motor via overhead rail. After the

(Continued on Page 28)

Announcing the
AMERICAN SOCIETY OF TOOL ENGINEERS
MACHINE & TOOL PROGRESS EXHIBITION

CONVENTION HALL, DETROIT, MICHIGAN

MARCH 9, 10, 11 and 12, 1938

In connection with the 1938 Annual Meeting of the American Society of Tool Engineers, there will be a Machine & Tool Progress Exhibition which will show the latest developments in Machines, Tools, Processes, Methods and Equipment of particular interest to the Tool Engineer. During the four days of this Annual Meeting, there will also be technical sessions, plant visitations and entertainment for A.S.T.E.ers from all sections of the country. Special excursions are being arranged to bring these men and their friends and all production executives to Detroit from the various industrial centers and chapters of The Society.

Adequate facilities for the mammoth show have been arranged for in Detroit's huge Convention Hall. Arrangements are being completed to handle the large delegations from various cities as well as the large group of Detroit-automotive production executives who will attend.

EXHIBITORS: Many space allotments have already been sold. These are allocated in the order of their receipt by Detroit Headquarters. If you have not yet made your reservations for a booth, do so at once. Get full details, prices, etc., by addressing American Society of Tool Engineers, 5928 Second Boulevard, Detroit, Michigan.



Conveyors Expedite Goods in Process

By

J. C. Webb

Engineer, Jervis B. Webb Company
Detroit, Michigan

WHAT IS THE OPTIMUM volume per given plant and product?—where can we eliminate waste effort?—how can we conserve space?—these are three familiar questions constantly running through all manufacturers' minds. Tied in firmly with these and the many others is "how can we cut down our goods-in-process?" From cost accountant down through departments to the production foreman, cries of "too much goods-in-process" and "too much stuff in aisles" are common. The secret to cutting unnecessary process material out has been found to lie largely in a continuous flow of component materials from the raw state to the finished product with a minimum of halts, piling up, and idle machine time.

Continuous conveying systems supply this smooth flow. They provide this by making possible; (1st) transportation of goods in continuous small lots from work point to work point; (2nd) continuous automatic processing; (3rd) a work table for mass assembly; (4th) a moving, ever-available storage.

Transportation

In recent years manufacturers' suppliers have provided more and more ingenious machines capable of stamping out, pressing out, drilling, or extruding semi-finished and finished goods in great quantities in incredibly short time periods. These materials must be fed in rapidly, and, finished, they must be taken away rapidly. The old methods of holding up operation until a pile of material is accumulated and then cluttering up aisle space and valuable machine space until sufficient quantity is finished to make it profitable for a truck to cart materials away to the next machine is definitely fading out. The space, the time, the goods themselves, present costs.

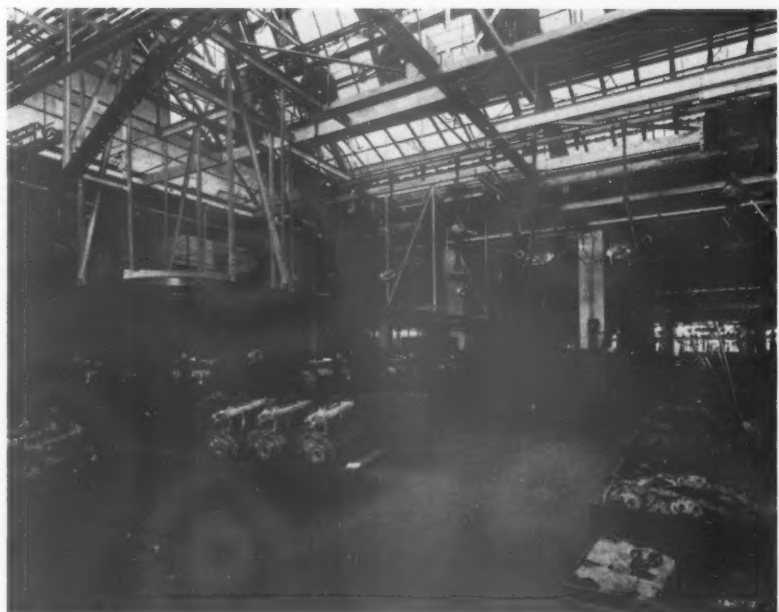
Here the conveyor enters the picture. Automobile companies, such

as Chrysler, Packard, Chevrolet, find the overhead trolley chain conveyor an ideal medium for feeding the material to their machines and then whisking it away. Provided with closely spaced tiered carriers with designated hooks for each stage of process material is in, these chain conveyors transport goods along the ceiling giving head room and complete aisle freedom. Flexibility of overhead conveyors is well exemplified by a conveyor recently developed for General Electric Company in Schenectady. The conveyor not only makes many small radius odd angle horizontal turns travel through housings from building to building, but also makes very small radius vertical dips and carries material to machines straight down and straight up again and out of the way. In this department, lack of building space has made it imperative to keep storage space at an absolute minimum.

By all means, overhead conveyors are not the only good methods of continuous transportation. Products which may be wheeled are handily shoved along by dog haul conveyors. In addition to complete horizontal flexibility, large radius vertical curves may be provided to bring materials up on ramps or down into tunnels. Bulk materials, bags, etc., are placed on slat, screw, belt, and roller conveyors of all types and descriptions to meet the special case. All of these provide continuous small lot flow of material to and from points of work. Where distances are very short between processes, sections of gravity roll are often used to good advantage. Easily moved from place to place, this useful frame of rollers provides cheap portable handling.

Another major problem brought about through the growth of high speed production machinery is the removal of scrap materials. Convey-

Transportation Interwoven at Packard Motor Car Company



ors are now developed to remove this material continuously as it falls from the tool. The Murray Corporation and the Chevrolet Gear and Axle Division are solving very difficult problems with special scrap conveyors.

It can aptly be pointed out here that the use of continuous conveying equipment is in no way limited to large factories. Many small producers have realized to their profit that if it is wise, economically, for them to provide themselves with modern machinery, such as multiple spindle drills, rapidly operating presses and multiple spot welders, it is also wise economically to provide means of feeding these machines with materials and getting the finished goods away to the next operation as quickly as possible in order that the maximum usage is obtained from these machines.

Processing

In recent years we have seen the manufacturer's supplies cut down the time of many processes and thus the time of material in process. Perhaps one of the best examples of this is in the lessening of paint drying periods. Again the continuous conveyor has come along to reduce handling to a minimum. Handling, all agree, is nonproductive work, and hence the elimination of it leads to much greater efficiency. Examples of conveyor-handled cycles of auto-

matic processing are many. Frigidaire Corporation has successful painting and Bonderizing systems. Foundries as that at Chrysler Dodge Plant make use of overhead conveyor for casting cooling purposes. Stove companies, such as the Edison Electric Appliance Co., use overhead conveyors in their vitreous enameling processes. Dipping and spray painting, baking, heat treating, etc.—all are done with saving by means of continuous conveyors.

Assembly

The successful use of the conveyor line in assembly is well known and appreciated. The automobile industry is absolutely dependent on it. Without it, mass production would be unknown. Few people would ever hope to own such commodities as automobiles, radios, etc. Perhaps the one big service the conveyor provided was a means whereby unskilled and semi-skilled workers working in conjunction could in reality produce that which only the master craftsman could produce if the whole had to be contemplated. But this big fact should not entirely submerge the important point that by performing jobs one by one continuously and not by large lots, the goods in process are again kept to a minimum. A visit to any progressive automotive plant reveals clearly how cleverly continuous systems by means of main line dog haul con-

veyors fed from above and either side with overhead conveyors have worked out perfect timing, order and consecutiveness in bringing the correctly trimmed green sports convertible fender to the right green sports convertible chassis. Conveyors are indispensable aids to production planning.

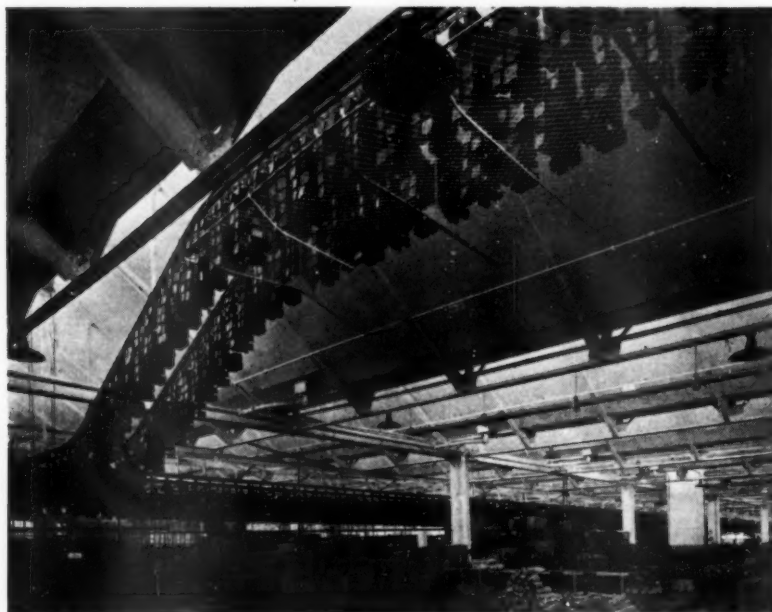
Moving Storage

One of the most impressive sights I have seen is a bank of some thousand fenders twenty feet from the ground moving continuously in a cycle among the trusses of the newly constructed General Motors Plant in Linden, New Jersey. Dipping down at three points, the conveyor provides every available storage. Up and out of the way, no valuable space is consumed. Coming directly from process and in quantity a bulwark just to supply the needs of the shipping department.

At the end of the line of process, there is no pile up of materials for they are immediately transferred to the moving storage and carried first aloft to gain the minimum desired back log of stock quantity and then on straight to shipping. This system of saturated storage is becoming an essential in many manufacturing systems.

Developments in conveying equipment in the last few years have been many. Some of the greatest are from what might be called the "inside." Materials capable of withstanding the terrific wear and fatigue of overloads, acid baths, paint dips, high and low temperatures, filings, foundry sand, etc. have been searched for and brought forth. Clever structural hanging methods have been devised to provide standard constructions which in many cases actually provide additional strength for the building in which the conveyor is hung. On the "outside" conveyors have been made more standard, more flexible. Ingenious automatic transfer systems have been worked out. Automatic unloading and loading devices at low and high speed have passed their developmental stage and can be now provided at low cost. All of these "inside" and "outside" developments tend to bring continuous conveyors to the point where, no matter what the physical construction, situation, or process involved, they can reach in, ferret out, and eliminate unnecessary goods-in-process.

Massed Moving Storage as Used by a Leading Radio Manufacturer.



MODERN TIME STUDY

Part II

By

F. W. Shumard

Founder

National School of Time Study
Norwalk, Conn.

AN ISSUE of paramount importance in modern time study is prescribing time postings that really mean something and can withstand, successfully, any challenge. A time study man must not only thoroughly understand the rating method, but must be able to apply it to all manufacturing processes so that the effectiveness of work elements are clearly known.

A bench job is identified as a manual operation because all work is done by manual effort. On machines where there are no power feeds and the operator controls each element, such operations are known as Hand Machine Time Operations. Power Machine Time Operations are ones performed in machines which have power feeds and thus complete a part of a cycle without direct help from the operator. A power machine time cycle is made up of element groups representing at least five major essentials, which are: Externals; Power Machine Times; Internals; Normal Working Time; and Available Idle Time.

External and Internal Elements

External elements are the manual elements which are performed by the operator before the power feeds are in action. The sum of the Externals, plus the Power Machine Times, results in a cycle. Assuming the P.M.T. elements are proper, the only way in which the cycle may be shortened—hence more production per hour—is to convert, if possible, some of the External elements into Internals, thus shortening the length of the cycle.

Internal elements are those subdivisions of manual work which occur after the power feeds are engaged and before Externals occur. Examples of Internals are: change extra dog on shafts; gage the finished work out of the machine; place on work rack the previously finished piece, etc. Internals do not influence cycle lengths because they take place while the machine is under cut.

The sum of all Externals and Internals represent the Normal Working Time of the operator. After he has performed them, his leisure time during the cuts is known as Available Idle Time.

Perhaps I can exemplify these five principles. Let us assume a milling

machine job. The operator picks up a piece of work from the machine table, places it in a fixture, tightens down several screws and after starting the machine, runs the table up to position and engages the power feed. All of the manual work thus far involved are Externals; no actual completion of work has begun until the milling cutter starts to produce chips. After the milling cutter is at work, the operator can do several things before the cutter completes its element. He can file the burrs off the preceding piece of finished work, gage the same finished piece, deposit it in a barrel and place a new piece of work on the milling machine table. No matter how fast or slow the operator performs these Internals, the cycle length is not affected.

The remaining cycle time is the Available Idle Time. If the Normal Working Time is short and the Power Machine Time long, the A.I.T. may allow the operator to sit down intermittently for many hours per day. In a case of this kind, modern time study practice suggests that an indexing type of fixture be applied to the operation so that the operator can be loading and unloading work in the idle station while the other is under cut. Or, two separate fixtures can be used, one at each end of the milling machine table, so that all work handling is done internally. If indexing or tandem fixtures cannot be prescribed, then the operator should be given one or more like or unlike machines to run.

A visit to an automobile factory reveals that few operators sit down. They are assigned extra like or unlike machines, or given fill-in work to absorb any leisure time accruing from the operation of but one machine. In the automotive industry where keen competition, top wages and short working hours prevail, the output per man must be high.

Manual Energy

Modern time study establishes the manual energy necessary for any given task and then determines the effectiveness of the operator assigned to that task. If the task in

question allows an appreciable leisure operator time between cycles, he should be given extra work to handle. Let me illustrate the principle of manual energy applied to manufacturing.

Two men of equal skill are hired by the employment office and each paid the basic hourly day work wage in effect in the community for that skill. Let us say that these two men are lathe hands; one is given a lathe which requires his constant work and attention and therefore has no idle time, whereas the other lathe allows the second man to sit down one-half of his time. The latter has 50% Normal Working Time and 50% Available Idle Time.

Now, if the true theory of paying only for manual effort involved is observed, the first man, under a wage incentive plan receives his basic wage, plus a full premium based on the fact he is continuously busy all day. The second man receives the basic wage, but gets only 50% of the premium enjoyed by the first man. The second man will soon request the foreman to grant him additional work to absorb his available idle time and thus make his earnings on a parity with the first lathe hand.

Group Plan

One of the factories in which our school's group class plan is in use is a New England machine tool plant that has many large production machines where the Normal Working Time per cycle is less than one-hundred per cent. For example, in the planer department, many machine bases are ganged up on the table of a large planer and the cycle lasts for hours, requiring but little work and attention on the part of the operator. What does this operator do between cuts—does he sit in a chair reading a newspaper? No, he does not. Alongside of his planer is a bench where he scrapes bearings of parts foreign to his particular planer job, or does other work to make his normal working time as nearly one-hundred per cent as possible. He welcomes the fill-in jobs while his planer is in operation, so that his bonus money, added to his basic pay will yield a maximum daily wage.

If there are plant executives reading this who have in their plants

certain machines yielding long cycles and attendant available idle operator time, their profit margins must be long. Remember the bee in its quest of honey. Sooner or later competitors will be attracted to your products.

In multiple machine assignments, the time study man must build into his standards many issues not encountered in bench operations. He must accurately determine the attention time the operator is allowed to successfully handle his complement of machines. By attention, is meant the time allowed to maintain the proper watch over each machine and anticipate any trouble on them which may arise while his attention is directed elsewhere in pursuit of his official activities.

Interference is granted to cycles only when more than one machine is handled by one operator. Interference is that portion of time after a machine has completed its cycle and during which period it is inactive and awaiting the services of the operator. Interference factors should not be guessed at—they must be determined by measurement. The total interference granted for a multiple machine assignment should not be over 10% to 12%—less if possible. An erroneous theory sometimes followed by the unskilled time study man in seeking to eliminate available idle time, is to prescribe the operation of several additional machines whose cumulative interference times may add up to more than 12%. In that case, common sense dictates that high priced, valuable machines, inoperative for a large percentage of time, are less productive by being held up on account of interference. Of course, the remedy is to prescribe a lesser number of machines per operator and assign, instead, fill-in work of another nature.

Set-ups are other phases of productive practices. A set-up is the initial work of preparing a manual or machine operation for manufacture. It may apply to the beginning or end of a quantity of one or more pieces or lots of work. A set-up operation should carry its own separate standard or piece work price. It should not be absorbed in the time allowance specified for the regular work completed on machines between set-ups. Set-ups should be treated as Direct Excess Costs and shown on cost statements as individual expense items. No right thinking foreman would order the setting up of a Brown & Sharpe automatic screw machine merely for the purpose of running off a few small studs

on it. Instead, he would have the few studs made on a small, wire feed screw machine for obvious reasons. Thus, an expensive set-up for the few studs would be obviated.

Set-ups should be treated as excess costs because, first of all, no actual work is being done during the set-up time. In fact, actual productive work is being held up during the set-up intervals. We can look upon set-ups as necessary evils; they must be done, but should not be done any oftener than is necessary. This statement might be supplemented by saying the frequency of set-ups should be determined by their costs; the quantity of parts made and used per day; the tied up capital involved in inventories; and the sales volume, which may vary during the year.

Slow Moving Inventory

The manager of a plant who, in conducting a visitor through his raw and finished stock rooms, points out row upon row of parts subject to a slow moving inventory turnover, is only pointing out frozen capital which might well be employed elsewhere. Many of the automotive companies operate on a 2 or 3-day inventory, with the exception of malleable iron and a few other materials.

The time study man is interested in set-ups because too many of them cause time leakages, hence cost leakages. There is a formula too involved to go into here which recognizes the cost of finished parts, their daily consumption, the yearly requirements, the investment and interest charges, etc., and determines a balanced ratio between set-ups and the parts produced between set-ups.

No two pieces of work are exactly alike. They may vary imperceptibly as to chemical and physical contents, contours, weight, heat treatment, accuracy, finish. These items are called Variables and may be so slight that they will not affect noticeably an operator's performance. On the other hand, the variables may be so pronounced as to cause varying manual effort to complete the operational work. Loose flask pins, too much pattern ripping, carelessly set cores, improper ramming of sand, wrong pouring temperatures and scores of other things might cause foundry castings to be of such varying shape or weight that no matter how skilled the machine shop operator may be, his performance is erratic. Many other examples could be given concerning Variables to illustrate the varying manual effort necessary for variable conditions.

Time Studying Unlike Work

An operator who claims that on his job no two pieces are alike might be entirely truthful, but he speaks unwisely if he contends such work cannot be time studied. No matter how pronounced the Variables may be, enough pieces in a representative lot of work can be set aside and the variables classified. Three broad classifications may be established: good, average and bad, and when they are converted into terms of percentage as representative of average, anticipated run-of-the-mill material, each classification can be analyzed accordingly and weighted values of time placed on them. Should the variables grow better or worse, standards can be adjusted accurately to compensate for the changes.

There are occasions where complicated operations are so filled with Counts, Changeables, Constants, Incidentals, Preparation, Variables and other factors that one standard will not suffice; it will not embrace fully the magnitude of the fluctuations. In such instances, the standard must be split up into subdivisions—one being applicable to the elements which remain constant and the other time allowances cover the changeables. Hyphenated Standards, if properly built, will truly reflect the manual energy expended on varying tasks.

Fatigue

Fatigue is a by-product of manual energy. It is a natural consequence of expended effort. If the energy output exceeds the recuperative powers of a properly selected operator for some given task, it is imperative that that job be changed. It must be made easier to cause less required output of energy and consequent lowering of efficiency.

I only wish space permitted me to say much about fatigue and the casual way in which it is treated by many time study men. They will analyze time and rate job elements with utmost care and reflect their basic time allowances to a significance extending three or four places to the right of the decimal point. To this formidable looking figure is added a blanket rest allowance—usually about ten per cent. That 10% obtains whether it is for the pouring of hot iron from a ladle by a moulder, or for a light bench job where the actual fatigue is quite negligible in comparison. Surely, there is a vast difference between these two types of jobs and the rest allowances granted for them should be decidedly marked in their differences. (Continued on Page 34)

Belt Conveyers Render Valuable Service in Many Industries

By E. A. SMITH

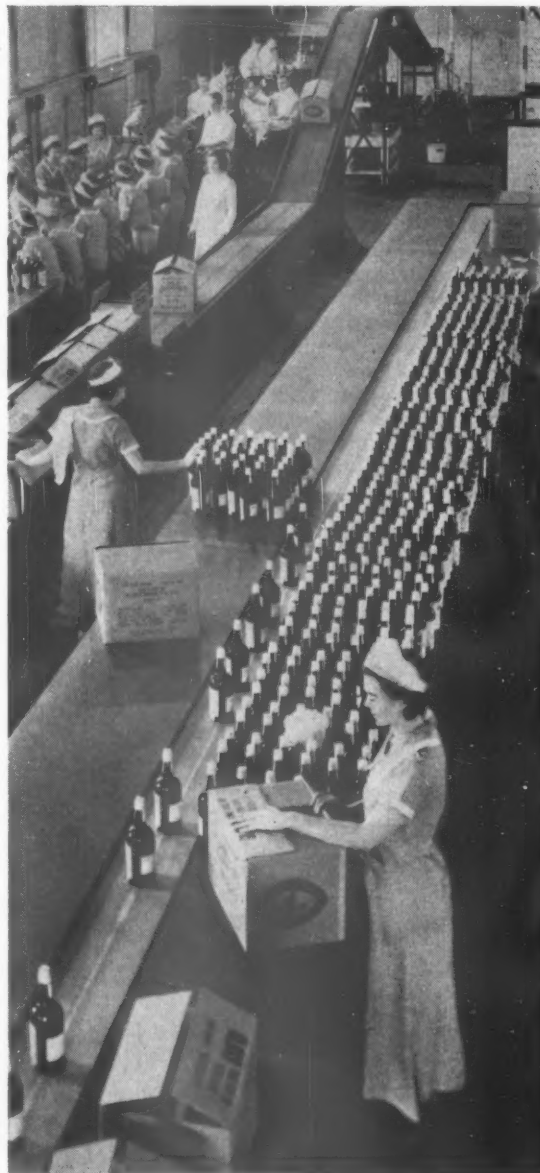
Engineer, Mathews Conveyor Company
Ellwood City, Pa.

IN many industries, when power-driven materials handling equipment is needed, the belt conveyor is often applicable. This is due mainly to the versatility of conveyers of this particular type. True, many types of conveyers such as trolley, chain, and live roller conveyers can be designed to cope with unusual conditions, but the belt conveyor is the one most closely approaching universal application. Let us look at the possibilities involved when applying belt conveyers. They can be level, inclined, or declined; they can be reversible; they can be set at working height on the floor, or be suspended from the ceiling out of the way of other activities; they can be stationary or portable. In fact, a system incorporating belt conveyers, if well-engineered, can be a most flexible handling setup, simply because conveyers of this type offer great flexibility. In Figure 1 is shown a typical application of belt conveyers, several of which make a system for handling bottles and cartons. The belt conveyor in the rear is arranged to allow headroom around bottle filling, capping, and sealing machinery. It is inclined, level, declined and level with the drive mechanism placed at the head end. This conveyor is used to bring empty cartons to packers and is an example of the flexibility of belt conveyor design. Two belt conveyers running parallel to this one serve to convey filled bottles from labelers to packing tables.

When discussing belt conveyers, the method of supporting the belt and load should be considered. Rollers are the most commonly applied in this regard. It has been said that a belt conveyor is no better than the rollers which support it, which statement is obviously sound. Usually tread rollers are complete with ball bearings, although friction bearings can be applied. It is poor judgment and certainly poor economy to support a belt conveyor with cheap, inadequate tread rollers. In doing this, one eliminates a strong point in favor of the belt conveyor—its dependability. In cases where the conveyor is short and the load fairly light, a solid supporting surface is often used under the belt in place of tread rollers. Such a surface is known as a slider bed. It may be constructed either of wood or sheet metal. There is practically no vibration where slider beds are applied. This construction affords the smoothest possible means of conveying. When this type of belt conveyor is used it is constructed of heavy gauge galvanized sheet metal formed of one piece, making a troughed "U" shaped section. The belt slides over the smooth surface of this trough and conveys the commodity.

Perhaps at this point it would be well to touch on the subject of belt conveyor drives, for no matter how generally or technically one discusses belt conveyers, drive design should be considered. One of the most practical is the tandem drive, the pulleys in tandem being connected to a gear reducer which is in turn coupled to a motor. Another, and probably more generally used setup, employs pulleys in tandem, chain-connected directly to a gearhead

Figure 1. Belt Conveyers serving packing and inspecting operations in large distillery packing room.



motor, a unit containing motor and gear reducer within one housing. The tandem drive can be applied at any point along the conveyor, and offers a maximum live load with a minimum of total belt tension. Thus, small end pulleys may be used, allowing no wasted floor space at either end of the conveyor, and permitting close connection to production machines, work tables, or other conveyers. Belt conveyers incorporating this drive design vary from 6" to 24" in width (carrying surface) and from a few feet to 200' in length.

When a belt conveyor must be quite long and the load to be handled is heavy, the conventional head-end drive is used. In this design the chain connection is direct to the head pulley, with takeups applied to control the amount of tension and slack in the belt. In every case the power requirements for belt conveyers are comparatively low.

When a belt conveyor must be level and inclined, a two or three-pulley arrangement known as a snubbing device is applied. This device, located at the point of inclination, changes the belt from a level to an inclined plane. These snub pulleys are sometimes conveyor rollers, anti-friction bearing equipped. In cases where cartons or boxes must be transferred from gravity roller to an inclined belt conveyor, such a transfer is not pos-

sible if the angle of inclination exceeds approximately twelve degrees. The cartons or cases would stop at the point of inclination. This problem is easily solved, however, by the application of a straight section of belt conveyor to receive the material from the gravity line, and then inclining the conveyor to the desired degree by using a three-pulley snubbing device at the desired point of inclination.

Many types of belts are available for specific kinds of service, thus contributing to the flexibility of belt conveyers. In the food industries, for example, where sanitary conditions must prevail, belts having a rubber-covered top and bottom surface are used. Where steep inclines and declines exist, belts having a rough top surface are quite generally applied. Figure 2 illustrates this point. Filled cartons are conveyed from lower floor to this upper level for storage on such a belt. An inclination of 25 degrees is about the maximum for cartons and shipping cases of average weight. Belts available are stitched canvas, solid woven, rubber, rubber-covered, duck, steel mat, wire mesh, and heat-resisting types, all designed to serve a definite purpose in the handling of a product, whether that product is food, machinery parts, glassware, merchandise, or in fact any commodity which can be conveyed in this fashion.

An application of belt conveyers

which merits special attention is that of serving as an assembly line. A slowly moving belt conveyor set at a working height which is approximately 30" above the floor, affords an ideal assembly conveyor, whether it be in a bottling house, box factory, or electrical appliance plant. In these industries, as well as many others, a system of this kind affords rapid labeling, stamping, and inspecting operations. When applied in this manner, belt conveyers greatly speed up operations and add continuous flow methods; production is increased, and confusion is minimized.

In applying belt conveyers, it is often desirable to deflect material from the conveyor at a predetermined point. For example, in Figure 2 cartons are being deflected from a belt conveyor onto a live roller line. This deflector, made of steel, is of the portable type. It can be changed so as to deflect cartons in the opposite direction, or can be removed, thus allowing the cartons to pass straight through on the belt conveyor to another section of the storage area. There are several types of deflectors available. Some are operated by hand, others by a cable attachment, remotely controlled; some are stationary; others are portable. A very common design is that which has the deflector mounted on a shaft, which operates on anti-friction bearings. A deflector of this type may be locked into place, and quickly swung out of deflection position when that is desired. This type is usually remotely controlled.

Belt conveyers have a certain value from the point of view of a production manager. Consider an operation in which a belt conveyor carrying a line of empty packages serves a packing table, as in the case of Figure 1. The packages are delivered at a predetermined rate. The operator is required to fill each package and replace it on the conveyor which carries it to the wrapping or sealing machine. If the speed of the belt has been set at a rate best suited to efficient operation, then it will continually deliver empty packages to the operator so that a high rate of efficiency is maintained.

In the belt conveyor we have then a versatile, flexible unit of materials handling equipment. Whether the situation involves the handling of food products, tobacco, loose or in packages, bottled goods, cases, crates, storage batteries, glassware, or bags of grain, a belt conveyor, well-engineered and properly applied, will do the job well.

Figure 2. Cartons arriving at warehouse on inclined rough-top belt conveyor and being deflected onto live roller conveyor line. Note compact drives, located entirely within limits of conveyor frames.



PRODUCTION PERSPECTIVES

News of Mass Manufacturing from Everywhere

Little change in conditions that govern industrial activities is in prospect for the immediate future, but several developments promise improvement early in the new year. Around Detroit the automotive picture looks more encouraging and heavier production of the new models is definitely anticipated.

Mid-West

Of particular interest at this time is the announcement made recently by Ford R. Lamb, executive secretary of The American Society of Tool Engineers, that a Machine and Tool Progress Exhibition, sponsored by the Society, will be held at Detroit's Convention Hall March 9, 10, 11 and 12. Special excursions will be run to Detroit from all parts of the country to bring A.S.T.E. members and other interested production executives to Detroit for the four day conclave — annual membership meeting with outstanding technical sessions, plant visitations and entertainment as added attractions to the show.

From Cleveland we hear that the White Motor Company has received a number of substantial fleet orders as well as much foreign business. The work of assembling twenty of the latest model Aero-Weight aluminum city transit coaches recently ordered by the Triboro Coach Corporation of New York was started the middle of December in the new plant of this company, now employing 165 men and occupying in excess of 150,000 square feet at E. 79th Street and St. Clair Avenue. This division of the company is expected to have a production capacity of from 1,200 to 1,500 coaches per year.

As a tribute to a skilled shop force built up on short notice from a depression crew, P. E. Bliss, president of Warner & Swasey, on December 4, asked his assembled regional sales chiefs to find business to keep the plant busy.

Bliss said that two years ago the company had to find shop men and train them. Today, he said, it is the responsibility of the sales force to find customers to keep the men at work.

"Our task," he said, "is to find the business that will enable us to bridge this period of mental uncertainty." The whole country is ripe to go forward. There is no company of

importance in the country that lacks the money and credit necessary to go ahead with every legitimate improvement. It may be difficult for business to get going again but there is nothing basically wrong, nothing which cannot be corrected. Wages are not too high, though some may have moved up too fast. The banks are full of money which they are ready to lend, inventories, though some were excessive, are being depleted faster than most of us realize. The only thing lacking is the proper state of mind and everyone now seems ready to work together to bring this about."

John Gould Jennings, chairman of Lamson & Sessions Company, formerly president of that company, and vice president of Johnston & Jennings Company, forge and foundry machine manufacturers, died November 21 at the age of 81.

The largest lathe ever made for grinding crankshafts has arrived in Cleveland. The huge machine—54 feet long and weighing 31 tons—was unloaded at the new plant of the Ohio Crankshaft Company, E. 42nd Street, near Harvard Avenue, Cuyahoga Heights. A. B. Byerley, plant engineer, explained that the new machine, built by the Landis Tool Company, Waynesburg, Pa., will be capable of turning out Diesel engine crankshafts twenty feet long, with sixteen cylinder "throws." Such shafts weigh 4,500 pounds. The new plant, which is expected to be opened early in 1938, will triple the capacity of the company, which also has a plant at 6600 Clement Avenue S.E. The new plant will employ 150.

Mel Kordenbrock, formerly with Lodge & Shipley and the Sterling-French Machinery Company of Detroit, has announced the opening of the Kordenbrock Machinery Company in the Machinery Building, Detroit. Mr. Kordenbrock will handle metal and plastic machinery.

David C. Forsman has resigned from the Sterling-French Machinery Company to take up a selling connection with Colonial Broach Company in their machinery division. Mr. Forsman will also handle the sales of Michigan Tool Company machines in the Detroit area. Before going with Sterling-French Machinery Company, Mr. Forsman was for 18 years with Reed Prentice Company—10 years of which he served as western sales manager.

Tom Saffady, formerly with Whitman & Barnes and later with Morse Tool Company has opened a cutting tool shop in Detroit, known as State Tool & Cutter Company. George Jenkins, formerly with Detroit Gear & Machine Company, and Ray LaBoissiere, formerly with Packard Motor as master mechanic, and Paul Gjertsen, formerly with Micro-matic Hone, are associated with the new company.

East

Westinghouse is headed toward upward revision of its schedules at East Springfield and Chicopee Falls, Mass. Smith & Wesson, Inc., is in line for moderate improvement at its revolver plant in Chicopee and some enlargement of operations at the United States Armory in Springfield is anticipated. Employment figures show that in the metal trades Western Massachusetts establishments have thus far experienced only moderate curtailments of production, but much of this is on the strength of backlogs.

The extent of automobile manufacturing in the near future is one of the uncertain factors which will influence the conditions of several New England establishments. Railroads and utilities are marking time in the matter of purchases for modernizing and expansion, the former awaiting the outcome of their application for an increase of freight rates and the latter holding off for court decisions and further clarification of governmental policies.

Mill supply concerns and steel distributors are doing a light business at present and purchasing agents for manufacturers are reported as generally covering only for immediate needs, with the prospect that heavy purchasing may be deferred until February. One reason for this lack of activity is that more than the usual volume of purchasing was done in advance of the final quarter, to get ahead of price increases and another is the result of deferring or canceling arrangements for new equipment to have been installed before New Year's.

Production in the refrigeration division of the East Springfield Westinghouse plants is expected to increase about 10 per cent in January. Three-shift operations are expected to be resumed within three weeks. The bulk of 800 employees, recently

(Continued on Page 36)

CHAPTER DOINGS

BALTIMORE

I. J. Buckley, Publicity Chairman
5903 Elarode Avenue, Baltimore

Surely No. 13 has cast no superstitious spell over the evergrowing activities of the Baltimore Chapter.

They adopted this number unanimously for their chapter at the first meeting held October 13, and, for the second time in three months 13 has appeared as the date of the December meeting, held at the Longfellow Hotel.

Mr. J. A. Snyder of the Morse Twist Drill & Machine Company gave an illustrated talk on all types of twist drills, taps, reamers and cutters together with a thorough explanation of their uses and cutting action on various kinds of aluminum alloys and steels.

The meeting was particularly active from the point of questions with which many of the members were well prepared and which resulted in many interesting discussions. Questions are always significant; of live interest. The main object of these gatherings is to provide a clearing house for our daily problems and a means of interchanging ideas by which we can all profit.

At our January 10 meeting to be held at the Longfellow Hotel Mr. E. M. Heiniger, Consulting Engineer of Philadelphia will discuss centerless grinding and centerless tapping.

The Entertainment Committee chairman, Mr. Kost, stated that he was formulating plans for a dance to be announced shortly after January 1. All members voiced approval of such action and offered their full cooperation to make it a gala event.

A rising vote of thanks was given Mr. Snyder in appreciation of his excellent discussion.

BRIDGEPORT

E. H. Ebelhare, Chapter Publicity Chairman
323 Trumbull Avenue, Nichols, Conn.

The December meeting of the Bridgeport Chapter was held at the Barnum Hotel, December 9, 1937, at 8 p. m. Preceding the meeting an informal dinner was enjoyed by a number of the members and guests. Chairman John Bullard opened the informal meeting and made the following announcements. The members of the local chapter are invited to attend the first regular meeting

of the newly formed New York-New Jersey Chapter December 14 at Newark. Our old friend, Fred Shumard, will be the guest speaker. Congratulations to the new chapter! Announcement of the A.S.T.E. Machine Tool Progress Show to be held in Detroit March 1938 was given and it is hoped that Bridgeport, with its many concerns in Machine Tools, will be well represented. The January meeting will be held the 13th; principal subject will be Development and use of Carbonyl Tools.

Mr. Dundore introduced Mr. E. Gillane, of the Underwood Elliott Fisher Co. Mr. Gillane's subject was Tool Costs. He gave a clear and concise picture of tool cost, its origination, method of handling, recording and information that is available to properly handle costs between the accounting and tool departments as used in his company. The success of any cost setup, Mr. Gillane pointed out, was based on full cooperation from all parties concerned. His talk was well received and upon its completion a discussion period was opened which proved to be the best in which the chapter has ever indulged. Many of the questions were handed to Mr. Dundore by Mr. Gillane for answer. Our secretary very ably had all the answers. Incidentally, in this day and age the Tool Engineer just HAS to have all the answers.

Following the discussion period, Mr. C. A. Shephard was introduced and gave a comprehensive talk on the Alco Die and Drill Heads, Tap and Die Holders. Among the many advantages of these tools were the floating shank, enabling accurate centering for the work besides compensating for any difference between the lead of the lead cam and the lead of the thread of the die, when these tools are in use in screw machines.

The dinner prior to the meeting was enjoyed by a number of gourmets whose main forte seemed to be sea foods. Chief among these epicures were Bullard, Gillane and Merwin. All of which recall to memory the delicious chicken and frog leg dinners Detroit offered in the 1920's.

Ben Page reported on his trip to the New York-New Jersey Chapter's organizing meeting. Ben's only com-

plaint of the trip was that he got home much too early.

Joe Berta demonstrated his patented window lock. A fine device to have fellows, but how are you Tool Engineers going to crawl in the windows late at night so as not to awake the "little woman"? Joe, you've got to give us an out on that.

Thanks a lot to C. A. Dundore for helping me out on the last two issues of "The Tool Engineer."

CLEVELAND

R. B. Oswell, Chapter Publicity Chairman
1585 Hawthorne Drive, Euclid, Ohio

Members, wives, sweethearts and guests, to the number of 160 braved the inclement weather on Friday evening, December 17, to attend the annual Christmas party of Cleveland Chapter A.S.T.E.

They were either the biggest liars or the best satisfied crowd this writer has ever seen. He has yet to hear anything but compliments for the committee. Guild hall proved to be an ideal place for such a gathering and a spirit of good fellowship seemed to permeate the crowd, from the welcoming speech by Chairman Paul Zerkle, to the awarding of the prizes after the games.

Dinner was served at 7 P.M. and Carl Monihan's band soon had the crowd singing without the aid of stimulants. After dinner, there was dancing until 9:30; then the real fun began.

Upon purchasing a ticket, each one was given a supply of paper money with which to play the various games. At the conclusion of the games each person was requested to count the money he or she had left and place it in an envelope with his name and the amount of money written on the envelope. These envelopes were then collected and those having amounts nearest to numbers previously selected were recipients of beautiful presents.

How those girls love to gamble!

The committee wishes to express its appreciation to the following for their cooperation and the valuable prizes which they donated: Wyatt Sales Co., National Broach Co., J. C. Ulmer Co., National Twist Drill Co., Paul Zerkle, Henry P. Boggis Co., Firth-Sterling Corp., T. Frazer, Hal Reynolds and Bunell Machine Co.

The committee also wishes to thank the John Bath Co. for the souvenir scales and Strong-Carlisle-Hammond Co. for the "Mac It" pencils. Each of these was greatly appreciated as souvenirs by those present.

DETROIT

R. M. Smith, Chapter Publicity Chairman
12775 Greenlawn Avenue, Detroit, Mich.

Dinner was served to 327 members and guests in the plant cafeteria of the Chrysler Corporation, Thursday, December 9, 1937, as the Detroit Chapter met for their monthly gathering. This was the meeting promised us just a year ago and necessarily postponed because of labor unrest. Certainly nothing was lost, because of our wait! Interest was high, goodwill beamed. Coffee and cigarettes finished off our banquet and at 7:45 P. M. the meeting was called to order by Chairman Staples, who thanked the Chrysler Corporation for their invitation to us and for the courtesies extended the group.

Mr. Frank A. Shuler, National President, announced the plans to hold a "Real" Tool Show in Detroit in March. Mr. Ford R. Lamb, Executive Secretary, enlarged on Mr. Shuler's announcement. The show is to be held at Convention Hall Wednesday, Thursday, Friday and Saturday, March 9, 10, 11 and 12. March 9 to be "Detroit Day." It is planned that exhibitors are to include all phases of Tool Engineering and merchandise developments, so as to give Tool Engineers and others a better knowledge of the tools they have to design and develop. The members applauded their approval of the Machine & Tool Progress Exhibition.

Plans for the new year were briefly outlined. Because of the show, the nominating committee will be elected in January at the next regular meeting. Chapter Officers will be elected in February. The show will postpone other activities until after March. Officers will be installed in April. The meeting for January 13 will be sponsored by Mr. John Livingstone.

Professor J. J. Caton, Dean of the Chrysler Institution of Engineering, discoursed on the subject of "Is a College Education Necessary?" Amongst other things, colleges provide a cultural background, so necessary for the balanced advancement of the engineer, and so hard for the ordinary man to acquire. Professor Caton concluded his speech by extending us another invitation to be future guests of the Chrysler Corporation! That's fine of you Mr. Caton, thanks—for everything!

At 9:00 P. M., the meeting adjourned to permit us to go in groups through the testing laboratories, the laboratory being opened for our special benefit. A number of the

Chrysler Engineering Students were available as guides and kept us intensely interested in all phases of testing procedure until 11:00 P. M.

Thanks again Prof. Caton—for everything!

Meetings' Chairman, Dave Forsman, says our next (February) meeting will "ring the bell" with a "bang-up" program on Plastics, a subject in which nearly all A.S.T.E.ers are much interested. The Tennessee Eastman Company, makers of plastics materials, will provide a speaker for the occasion. Look for this important announcement.

HARTFORD

Frederic L. Woodcock, Secretary
56 Inlay Street, Hartford, Conn.

The largest Hartford Chapter meeting to date was called to order at 8 P. M. in the Hartford Gas Company Auditorium, November 29, by A. H. d'Arcambal with 188 in attendance. In the absence of the technical chairman Mr. d'Arcambal introduced the speaker, Mr. P. J. Horgan, of the General Electric Co., River Works, West Lynn, Mass., very colorfully and Mr. Horgan accepted in an even more colorful and vivid manner, continuing his talk in a spritely and dynamic style which caught his audience from the start.

The speaker covered the subject "Typical Examples of Welding" in a unique, thorough and splendid manner, reviewing modern welding in most of its phases and explaining numbers of details in a practical, progressive way. His talk was well illustrated with good, clear stereopticon slides. The entire talk was deeply engrossing and was followed by a vigorous discussion period.

Dinner was held at the City Club at 6:30 P. M.

MILWAUKEE

Emmor E. Houston, Chapter Publicity
Chairman
1029 South 35th Street, Milwaukee,
Wisconsin

A recent book "How to Win Friends and Influence People" must have dictated the policy of the December meeting of Milwaukee Chapter A.S.T.E.

Chairman Smart called for an executive session of the chapter members at this meeting. The most important topic discussed was that of membership. Heretofore our membership committee was the chapter at large but at no time was this function under any definite head. Mr. Costello consented to head this im-

portant committee, and this relieves a tremendous responsibility from our officers. Mr. Costello should be given the greatest co-operation from all the members in the Milwaukee area.

Mr. Harold Stein, Research Engineer, Allis-Chalmers Mfg. Co., discussed the heat treatment of tool steels very thoroughly and comprehensively. In this discussion he pointed out how strains were set up in tool steels in the hardening processes. It was interesting to know that failures in tool steel are usually blamed to inferior quality of the steel, but Mr. Stein stated that it was an unquestionable fact that most failures were due to inadequate knowledge in the hardening and quenching processes.

Patents and inventions are no doubt interesting to the Tool Engineer. Professor Russell Oaks, a Milwaukee advertising man, discussed and demonstrated probably for the first time, some of his unusual inventions. Professor Oaks stated that "invention" was just a matter of right thinking.

Mid Winter Stag

The night of January 28th should be marked on every Tool Engineer's calendar—it is our pleasure to announce the biggest, and most colossal affair of the year. Club Madrid will be the scene of the festivities—entertainment—and prizes galore. Make your reservations early.

We are pleased to welcome Herbert Zirzon, and Harry Szeclinski, formerly with Badger Tool & Engineering Co., as co-workers at Allis-Chalmers.

NEW YORK-NEW JERSEY

F. J. Oliver, Publicity Chairman
239 W. 39th Street, New York

It was a hard time naming this chapter, besides calling it No. 14, but the membership finally came through and pinned the badge on itself as given above. Notices for the organizational meeting held on Nov. 1 read "Northern New Jersey Chapter," the charter shingle reads simply "New York Chapter"; others would have called it Metropolitan or just plain New Jersey, where the bulk of the present membership dwells or has its job. A show of hands at the first meeting of the newly organized group led to the present decision. If the New York and Brooklyn delegation later form a chapter of their own, the name will be split. It was also decided to leave the territory "open" as far as membership limitations are con-

(Continued on Page 44)

HANDY ANDY'S ..WORKSHOP..

The New Dealers have coined a new name for depressions; they call this thing we're going through right now a recession. And, being a born optimist, I agree with the term, since by all the laws of demand we should be heading hellbent for prosperity and boom times. Demand, yes, because people were just really beginning to buy when

the slump came. Now, they're scared of their shadows, but shadows have no substance, often distort the real thing.

We're going to snap out of this thing quicker than we've ever snapped out of previous slumps. And, that isn't Pollyanna optimism, but the real McCoy. There are reasons. For, while domestic demand has dropped off because of layoffs and a feeling of uncertainty, exports are soaring, proving that foreign markets are sound. Also, people are becoming agreed that depressions

are largely artificial, a frame of mind, that they can be busted wide open, leaving a clear road to prosperity. That was proven in '33, along with the fact that, once the wheels start turning, somebody can gum the works. Certain factors now discourage interference.

I am not going into the causes of this recession, since there is considerable difference of opinion on that score, although people who think are quite agreed on the two major causes. Fortunately, the majority are beginning to think along the right lines; at least they're beginning to wonder what it's all about. We see the signs of change in election returns, in overwhelming majorities for conservatism, in an insistence for a lessening of government interference with business, in growing demand for repeal of oppressive taxation. This pressure will force results.

Unless I miss my guess, the automotive industry will take the lead in the upswing, as it took the lead in '33. Now, some of the makers are straining at the leash, waiting to get the jump on the laggards with greatly improved models. Then, watch the fun begin. That program is going to make the engineers—Tool, Process, Product, Plant, what have you—hustle plenty before the tulips are through blooming, let alone putting a legion of skilled craftsmen to work. The production boys, of course, will have a little more time to think things over. By the time production starts we may have solidarity for prosperity. It is said of the American people that we are the most patient on earth, but that when we finally decide that we've had enough of something we just get together and do things about it. We'd better get started.

Right now, far sighted leaders among management are planning improvements for the boom that is to come. Of course, the boys in the front office are in a huddle, and the signals haven't been called yet. But there is an air of expectancy, as of a surprise play, that somehow sends a tension through the sidelines. So, this is no time for discouragement, rather, it is a time for preparedness, when equipment makers should be developing new ideas, when salesmen and sales engineers should be making the rounds, surveying the field, maintaining morale. And, it may be added, this is the time to

(Continued on Page 42)

DUMORE

Does More By 15%

What do you find in the hundreds of shops where high speed grinding, precision to a tenth (.0001) and continuous operation are required? Dumore lathe grinders! One prominent manufacturer who uses a battery in a production line says: "We find that our new Dumore's have increased our units per day about 15%". The No. 7 "Giant"*, with its eleven quick-change quills, is one of the most popular in Dumore's line because (1) it is flexible enough to handle a wide variety of work and (2) it has the power and stamina to "take it". Learn how this or some other Dumore tool can cut corners for you. Write for facts—no obligation.

THE DUMORE CO., Dept. 228-A, Racine, Wis.

*AC-DC motor develops up to ½ h.p. . . 5,500 to 42,500 r.p.m. . . easily portable—weighs only 45 lbs.





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Socket Screws

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The New Patented Method by which Holo-Krome FIBRO FORGED Socket Screws are manufactured produces a completely cold forged Socket Screw—the very socket within the screw is cold forged—an exclusive Holo-Krome Feature!

A better looking—stronger—quality socket screw—Holo-Krome FIBRO FORGED Socket Screws—is the result of this patented process.

FREE SCREWS for TESTING gladly sent. Write Engineering Dept.

THE HOLO-KROME SCREW CORP.

HARTFORD, CONN., U.S.A.

Continuous Fibres

A Holo-Krome Feature—originating in the shank of the Screw continuing uninterrupted, unbroken and uncut around the socket bottom, between it and the shoulder of the screw and terminating in the socket wall. Machine Designers and Tool Engineers appreciate the value of Continuous Fibres.

HOLO-KROME

FIBRO FORGED SCREWS

Unfailing Performance



Quality

JANUARY CHAPTER MEETINGS

Chapter Meeting Announcements must be received on or before the 15th of preceding month to appear on this page. Members and friends of The Society contact Chapter Secretaries for meeting details if your announcement does not appear below.

BALTIMORE

January 10, 1938—Longfellow Hotel, 2 West Madison St. Dinner 7:00 P.M. Technical Session 8:00 P.M. Special meeting for members 6:30 P.M.

Speaker: Mr. E. M. Reiniger, Consulting Engineer of Philadelphia.

Subject: "Centerless Grinding and Centerless Tapping."

Please make reservations early by calling Vernon 5353.

CLEVELAND

January 11, 1938—Time and place will be announced later, by post card, to members. This will be a closed meeting, for the purpose of discussing matters of great importance to the welfare of the chapter.

DETROIT

January 13, 1938—Tuller Hotel. Dinner 6:30 P.M. Technical Session 8:00 P.M.

Speaker: Arthur Swenson, Sundstrand Machine Tool Company.

Subject: "Hydraulic Feeds as Applied to Machine Tools."

The speaker and entertainment are being supplied through the courtesy of The John E. Livingstone Company. There will be no tickets and members will be admitted by their notice or membership cards. Guests will be admitted by personal note or card from their host. Nominations for officers will be held at this meeting. Elections to be held at the February meeting.

January 20, 1938 at A.S.T.E. Headquarters 7:00 P.M.—Regular business meeting, Detroit Chapter.

Reservations: Call MA 7980 or contact officers or committee heads on or before Jan. 12, 1938.

MILWAUKEE

January 13, 1938—Republican House. Dinner 6:30 P.M.

Speaker: Frank Palmer, Carpenter Steel Company.

Subject: "Tool Steels."

Make reservations for stag, January 28, 1938.

ROCKFORD

January 12, 1938—At Fairbanks Morse & Company Plant, Beloit, Wisconsin. Plant visitation 3:00 P.M. Dinner 6:00 P.M. Technical Session, 7:45 P.M. Three lectures:

"Various Types of Machine Tool Motors and Their Application"—G. R. Anderson, Chief Engineer, Electrical Division, Fairbanks Morse Company.

"Motor Control"—A. C. Harwood, Cutler Hammer Company.

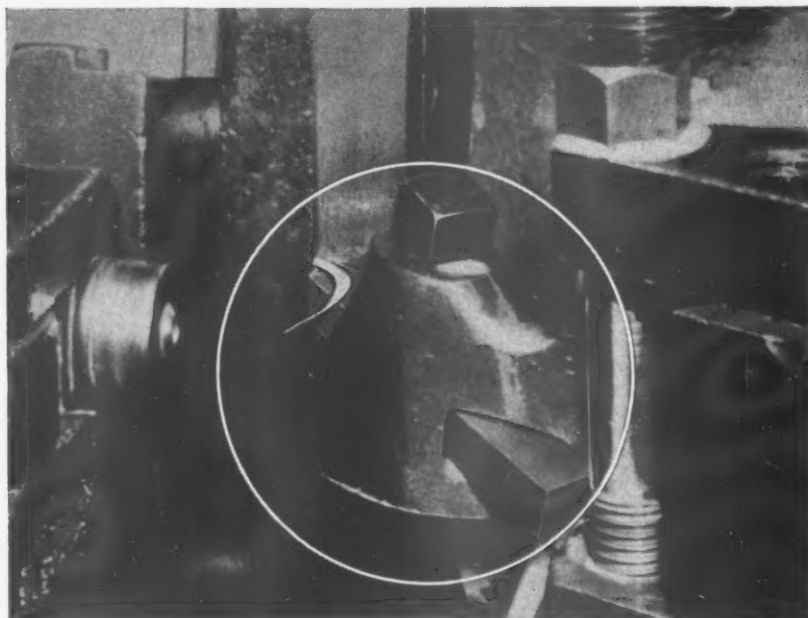
"Diesel Engines"—F. P. Grutzner, Fairbanks Morse Company.

Discussions following each lecture.

Reservations—Contact George E. Sorensen, Jr., Woodward Governor Company, Rockford, Illinois.

For machining Stainless Steels ...

use Haynes Stellite J-METAL



Turning a 12-inch stainless steel valve seat ring at 157 surface feet per minute.

• Most machining operations on stainless steels can be readily performed with Haynes Stellite J-Metal cutting tools. For example, 18-8 stainless steel valve seat rings are successfully turned, faced, bored and counterbored. The turning operation is shown in the accompanying illustration. Speed is 50 revolutions per minute—157 surface feet per minute; feed is 0.018 inch per revolution; and depth of cut is 3/16 inch. Six to twelve pieces are obtained per grind.

Write for the new book, "Haynes Stellite J-Metal Cutting Tools", a 56-page operating manual telling how, when and where to use these tools profitably ... Or ask a Haynes Stellite engineer to call and analyze your machining operations. He will help you determine whether or not Haynes Stellite J-Metal can increase production and decrease machining costs in your shop. There is no obligation.



A red-hard, wear-resisting alloy of Cobalt, Chromium and Tungsten

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Haynes Stellite Welding Rods and information on other Haynes Stellite Products also are available through the 42 apparatus shipping points of The Linde Air Products Company

Cleereman Jig Borer - Economical Precision Tool

THE Cleereman Jig Borer, a fine precision tool, was recently announced by the manufacturer, Cleereman Machine Tool Company, Green Bay, Wisconsin. While designed primarily for jig and fixture work this new machine will prove equally indispensable on tools and dies, and is a necessity for the economical manufacture of countless parts built in small quantities where jigs and fixtures are not warranted. These include multiple drill heads, machine tool accessories and attachments, parts for special machines, models and experimental work. With the built-in accurate measuring equipment, and its ability to accurately and efficiently do drilling, boring, reaming, tapping and light milling, it is frequently possible to completely finish these parts on this machine. The Cleereman Jig Borer is the culmination of more than 20 years experience building drilling and boring machines. Of simple, rugged construction, incorporating many of the time tried features of the Cleereman Sliding Head Drill, it is available at a price within the reach of practically every shop.

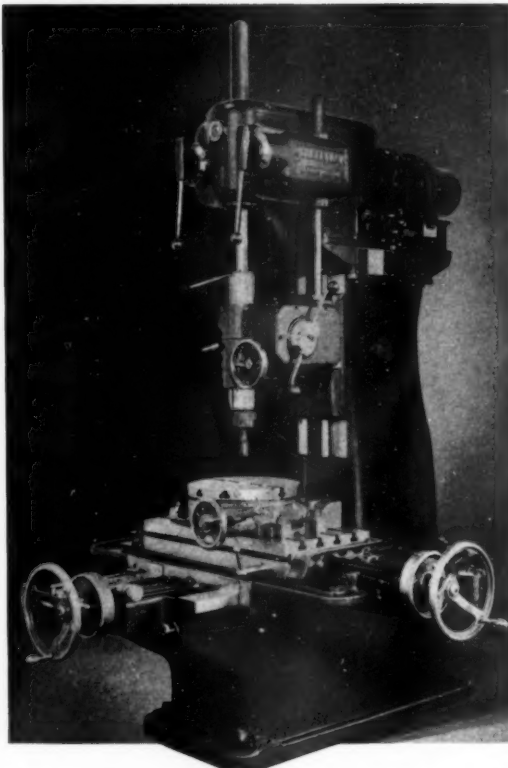
Important castings, such as the base, table, carriage, column and spindle head are all made of Meehanite which is a high strength, close grained, wear resistant cast iron. These castings are first rough machined, then normalized to relieve casting and machining strains and finally finish machined. Where essential, castings are very well ribbed and of box section construction. The carriage is a deep solid casting and is exceptionally long, supporting the table over its full travel.

To efficiently do the wide variety of work commonly encountered in jig and fixture work, the same 12 speed transmission employed in the Cleereman Sliding Head Drill is used. All gears are hardened with the teeth ground and lapped and are mounted on multi-splined shafts. Speed changes are quickly made with the single lever speed selector with speeds indicated on a direct reading dial. Two suitable speed ranges are available. The final drive

to the spindle is through Gleason cut and lapped spiral bevel gears, which provide a smooth, even flow of power.

Exceptional rigidity is obtained in the spindle head by virtue of its double box section construction and by the thorough manner in which it is strapped to the dovetail ways of the column. Long narrow guides together with broad flat bearing surfaces, assure accurate vertical alignment at any setting of the spindle head. The head is properly counter-balanced. The constant mesh feed worm and gear, which are totally enclosed and run in an oil bath, feed the spindle through a positive serrated clutch. Hand feeds are also provided.

The most important unit, especially of a precision boring machine, is the spindle and its immediate mounting members. Of the Cleereman Jig Borer spindle every small detail has received utmost consider-



The Cleereman Jig Borer recently announced by Cleereman Machine Tool Company, Green Bay, Wisconsin.

ation to make this unit the best possible. The quill is a hardened and ground alloy steel forging and is mounted in the spindle head in a ground bearing $1\frac{1}{2}$ " long, which is three times the diameter of the quill. The spindle is an alloy steel forging carburized, hardened and ground. It is mounted in the quill with a pair of pre-loaded super-precision ball bearings at the lower end and a single precision bearing at the top. The spindle is short and rigid. A flexible coupling is used to connect the spindle with the six splined driving end, completely isolating the spindle from the transmission and eliminating all possible vibration or gear tooth marks.

For the first time a jig borer is offered with a choice of either or both of the two types of measuring devices in common use; precision hardened and ground lead screws or end measuring rods.

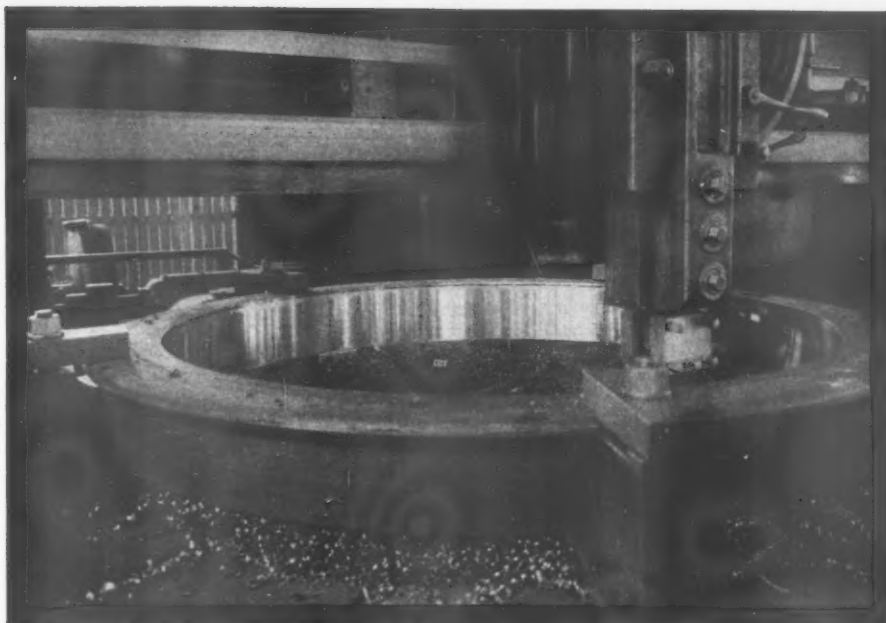
A three horsepower, constant speed, standard motor with integral brake is mounted at the top of the column and at the rear of the head and is directly connected to the transmission. No belts, chain, or friction clutches are used.

A number of fine accessories are available which enable this machine to do more work. Among these are the Precision Universal Boring Head, rotary tables, and other tools such as precision end cutting reamers, spotting tools, etc.

SPECIFICATIONS

Table size—16 x 30", Table travel—16 x 20", Swing at Plane of table— $32\frac{1}{2}$ ", Table top to end of spindle (max.)—24", Spindle travel—12", Spindle Head travel—9", Feeds in Thousands per Revolution of Spindle: 2.3-3.5-5.6-7.8-10-16-23. Speeds: Mention range desired—50-62-85-110-150-190-265-345-440-550-775-1000. 75-92-130-170-230-285-400-520-665-825-1160-1500. Floor Space 68" wide, 79½" deep, 102" high. Shipping Weight—approximately 6000 lbs.

Bryant Machinery & Engineering Company, 400 West Madison Street, Chicago, general distributors of Cleereman Jig Borers, offer these machines through leading machine tool dealers in all industrial centers.



Boring 50 inch locomotive driving wheel tire. Operations: rough cut with style 12 V-R tool, finish cut and cut retaining ring grooves with style 16 V-R tool. The unretouched photograph clearly shows the mirror like finish produced. Comparative results with H.S.S., and with V-R tools:

Tool Material	ROUGHING CUT				FINISHING CUT				Cutting Time per tire complete
	Feed	Depth	Speed	Tires per grind	Feed	Depth	Speed	Tires per grind	
Vasco-loy-Ramet	$\frac{1}{16}$ "	$\frac{1}{16}$ " to $\frac{1}{4}$ "	190 SFM	7	$\frac{1}{16}$ "	$\frac{1}{16}$ "	320 SFM	15	27 Min.
High Speed Steel	$\frac{3}{32}$ "	$\frac{1}{16}$ " to $\frac{1}{4}$ "	60 SFM	3	$\frac{1}{16}$ "	$\frac{1}{16}$ "	66 SFM	1	47 Min.

Assuming that the successive fractures in locomotive driving-wheel tires might be caused by a rough, scaly finish from machining at low speeds, an eastern railroad shop tested V-R, the tantalum carbide tool material.

The speed of roughing cuts was increased from 60 to 190, and finishing cuts from 66 to 320 S.F.M., when V-R tools replaced high speed steel.

Because of the high speeds possible with V-R, the primary purpose of the tests—a smooth, mirror finish—

was accomplished. And, in addition, tire production and the number of tires bored per tool grind have been materially increased, as shown in the comparative table above.

Such results and such production economies are typical V-R accomplishments.

"A grade for every use" may be the solution to the machining problems in your plant. Send for the V-R catalog price-list.

VANADIUM-ALLOYS STEEL CO.
VASCOLOY-RAMET DIVISION, NORTH CHICAGO, ILL.

VASCOLOY-RAMET

...The TANTALUM CARBIDE TOOL MATERIAL...



A GRADE FOR EVERY USE

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THE TOOL ENGINEER FOR JANUARY, 1938

VASCOLOY-RAMET BLANKS

Vasco-loy-Ramet is available in three forms, (a) completely finished tools, (b) milled and brazed tools, and (c) blanks. V-R blanks are furnished in 5 standard styles and in sizes to meet every requirement. To make tools with V-R blanks is a simple operation, fully described in a new instruction booklet, available free—upon request.

District Sales Offices:

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Newark N. J.
Knoxville Tenn.
Los Angeles Calif.
San Francisco Calif.

Single Rail Application

(Continued from Page 11)

motor has been assembled upside down, an electric hoist equipped with a special roll-over fixture is fastened to the motor which is turned over and placed on the final assembly fixture.

After the motor has been completely assembled, it is transferred either to storage or to a distributor conveyor which takes the motor to the Block Testing Department where the motor is taken off with a special rigid arm push button controlled electric hoist mounted on a hand propelled Tramrail crane and placed in the block testing fixture. After

block testing, the motor is transferred to distributor conveyors which take the motors to the Dynamometer Department where a final check-up is made.

From the Dynamometer Testing Department, the motor is taken either to motor storage, motor mounting station or the export shipping department where special bases are mounted on the motor and are transferred to the motor export conveyor where they are taken along side of specially equipped railroad box cars equipped with rack and bracket for Tramrail crane runway. The loading outfit is a portable Tramrail system consisting of removable crane run-

ways upon which a special transfer bridge crane is mounted which connects with a spur that runs along side of the motor export conveyor. The motor is taken from the export conveyor and placed directly in the car, thereby eliminating the rehandling of the motors. At the destination, a reverse system is installed and the motors are unloaded in like manner.

In the Chassis Assembly, the frames are removed from the frame transfer conveyor and placed on the chassis assembly conveyor where various parts are assembled. As the chassis progresses, the front axles and rear axles are transferred from their assembly department and mounted on the chassis. After all operations have been completed, with the chassis in the upside down position, the chassis passes under an electric hoist with a special turn-over fixture where the chassis is righted and ready to proceed to the final car assembly. The motor is taken from the distributor conveyor and mounted in the chassis by means of a special variable speed electric hoist from Tramrail to Tramrail cranes, depending upon the manufacturing methods.

After all sub-assemblies have been completed, the chassis is picked up with either a power driven electric hoist or hand pushed carrier and transferred to the final assembly conveyor where fenders and hoods are mounted on chassis and the body is lowered from the body assembly conveyor and placed on the chassis. The car now proceeds along the assembly line where the final touches are made and is ready for delivery.

Carl Zeiss

Appoints District Representatives

Carl Zeiss, Inc., who lately established a special department in their headquarters and showrooms at 485 Fifth Avenue, New York, to handle the sales and servicing of their precision gauging tools, measuring instruments, toolmakers' microscopes and projectors, announce the appointment of district representatives. Mr. Sid Langston, 1213 West Third St., Cleveland, will represent this Zeiss line in Northern Ohio. In Pittsburgh, western Pennsylvania and West Virginia, Zeiss will be represented by Mr. Edward W. Voss, 2882 East Liberty Avenue, Pittsburgh, Penna. The agency for Chicago, southern Wisconsin and northern Indiana has been placed in the hands of Messrs. Higgins & Linde, Inc., 564 West Randolph St., Chicago, Ill.

LESS BREAKAGE

See the Difference

WELDON

CUPPED END
END-MILL

STRONGER

1. No nicks to weaken teeth on the end of mill.
2. Heavy feeds will not clog end.
3. Formed teeth. Designed for strength, with lots of chip clearance.
4. Heat treated for a certain characteristic grain structure.

LET THE END MILL
ITSELF PROVE IT!

The
WELDON TOOL CO.

"Pioneers in Fast Spiral
Double-end, End Mills"

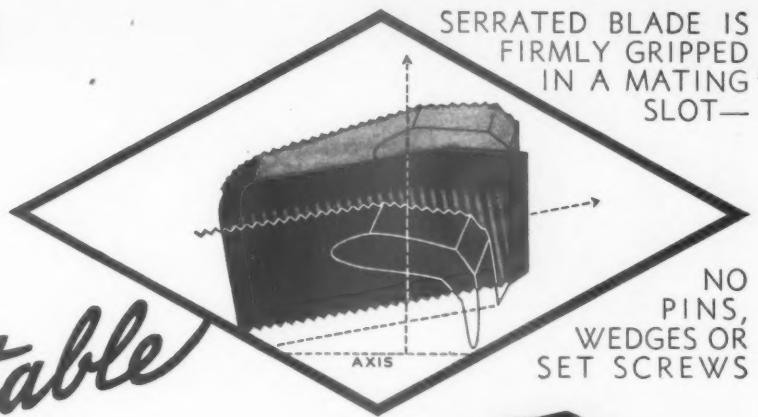
3000 WOODHILL RD.
CLEVELAND • OHIO

FOR ECONOMY AND SPEED

install the

NEW

*Dual
Adjustable*



Automatic Radial and Axial Adjustments—65% of Blade Usable!

SERRATED blades, tapered toward the bottom, fit into mating slots in the cutter body. There they are held—**without wedges, pins or set screws**—in an immovable grip. Yet, they can be easily driven out from the rear.

As the slots are on a 15° angle to the body, when the blades are set out one or more serrations, as required for regrinding, both radial and axial adjustments occur at the same time **automatically**.

These new blades made right or left hand fit either roughing or finishing cutter bodies. In rough milling, the blades shear into the work in the direction of feed. Major blade wear is on the periphery, the face of the blade merely scraping the work just cut. The blades are, therefore, inserted into the radial face of the body for rough milling, and the major adjustment occurs on the periphery. Where a finer finish is necessary, the blades are inserted into the periphery. Here the blades are ground with a slight lead to give the cut a "skiving" action. The major blade wear being on the face, the major adjustment occurs on the face.

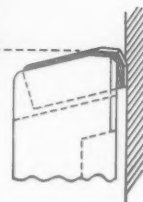
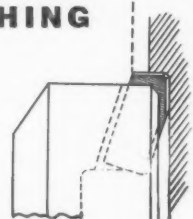
Glad to send complete descriptive pamphlet.



ROUGHING



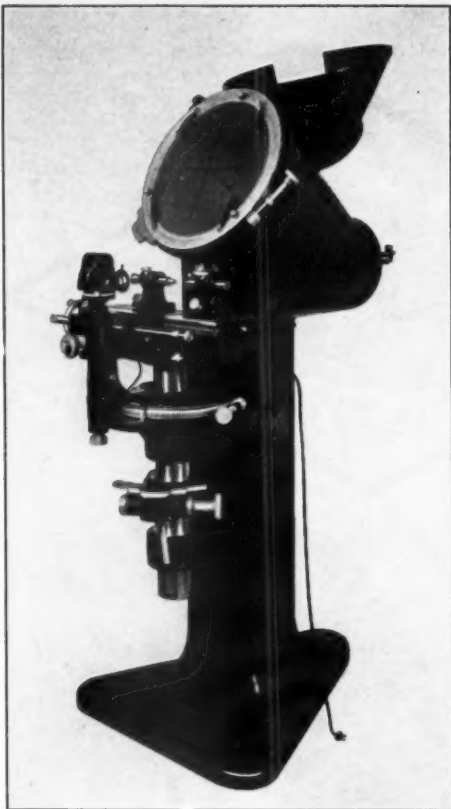
FINISHING



INSERTED-BLADE METAL CUTTING

TOOL SYSTEM

MANUFACTURED ONLY BY THE O K TOOL COMPANY, SHELTON, CONN., U. S. A.



Whether your threads are rolled, milled, die cut, or ground, the J&L Comparator and Measuring Machine is essential equipment to check either the tools or the product.

Your savings are not limited to threads. This method of optical measurement has been successfully applied to form tools, milling cutters, gear cutters, dies and punches, gages, and production parts. Ask for catalog.

PRECISION THREADING

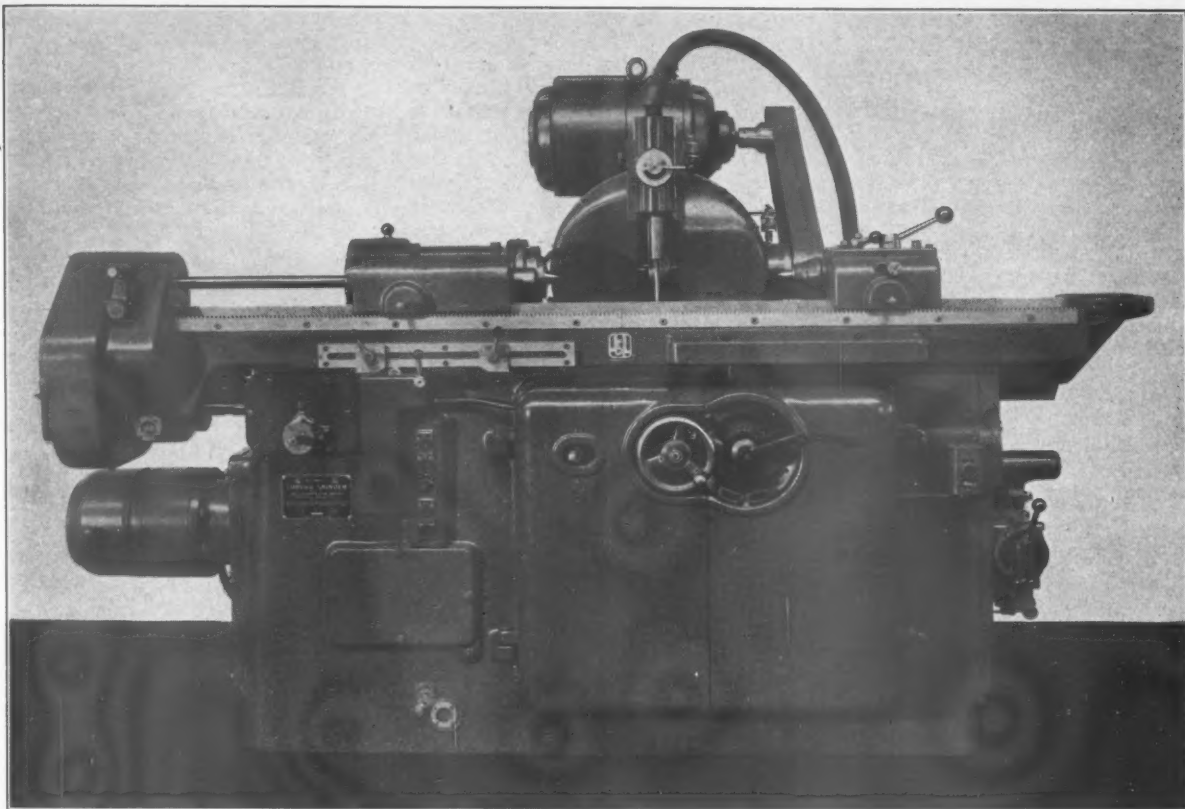


If the material is practical to die thread—J&L Tangent dies will give the lowest threading cost.

These dies are the acme of precision workmanship. The chasers are ground in the thread and are guaranteed to produce threads within class 3 tolerance. Literature on request.



**THREAD TOOL DIVISION OF
JONES & LAMSON**



ON A PRODUCTION BASIS

THE J&L AUTOMATIC THREAD GRINDER will grind threads in hard or soft materials, and intermittent surfaces such as those broken up by slots or keyways. Engineers more and more are specifying harder and tougher materials which are difficult, and sometimes impossible to die thread. In such cases the J&L Automatic Thread Grinding Machine has already taken its place in the production line. Complete catalog sent on request.

OF
N **MACHINE CO.,** Springfield, Vt., U. S. A.

These three modern J&L tools give a complete, low cost threading service.

Men and Materials

(Continued from Page 10)

a belt conveyor used in a large eastern market 30 years ago or more. To a boy, it was a rather marvelous contraption that moved meat, sugar, flour and the various goods of the store to delivery counter or shipping room. The belt conveyor lends itself readily to transport of bundles and cartons, while segmented steel belts can be used to move parts that might damage fabric. Sometimes woven chain belts are used in lieu of fabric.

Roller conveyors, sometimes set flush with the floor but often raised to convenient heights, are used to move parts from one machine to another. They are used to unload freight cars, the rollers permitting slight incline as against the steeper grade where chutes are necessarily employed. The rollers also tend to "track" the material, so that it does not fall off the conveyor. Roller conveyors, of course, can only be used on levels or on down inclines; they are limited in scope but within their range are reliable and cheap.

Many stores and supply houses

use spiral chute conveyors; these, of course, are "one way." They have an advantage in requiring little floor space, the outside of the spiral being the maximum outside dimension, and when they run from the top floor of a building down, can serve all floors. The pitch of the spiral and the bank determine the speed of the descending goods; one isn't supposed to use them for bowling balls, unless in cartons.

The foregoing, with variations, covers the general run of conveyors. For general movement of goods the truck, hand or motor driven, is largely used. Most industrial trucks have lifts and are designed for use with tote boxes or platforms having a specified lift height above the floor. Some trucks have stacking elevators to permit the stacking of boxes and cartons. Motor trucks are divided into two classes, those driven by gasoline engines and those with electric drive, the latter, as a rule, powered with electric batteries. I am told that one foreign country uses trolley trucks; that system, however, would offer too many hazards in our plants, besides losing in flexibility. Again, time and place largely determine the best method.

Regardless of method used, the main problem is to expedite the movement of goods from receiving department, through the various stages of storage, processing, finishing and wrapping—where that is done—to the shipping department. The type of conveying equipment may be limited or unlimited, depending on the buildings. Obviously, cranes cannot be used unless there is headroom, nor to advantage unless there is length and width. The Detroit plant of Midland Steel Products, as an example, uses about every type of conveyor mentioned in this issue, and some that are not. But there, buildings and demand permit these various types, and doubtless production would suffer were any method cancelled, except through obsolescence.

It is not necessary, of course, that one consider expensive conveying systems. Where operators work on small parts, and close together, a plain slide (often a smooth board or a sheet of steel) may serve admirably to pass parts from one station to another, is often preferable to a conveyor moving at a given pace. But obviously, where there is mass production there must also be movement of goods; it is up to the engineer to determine the best method suited to the demands and layout of the plant. Then, a decision made and

(Continued on Page 42)

The TRANSPARENT SOLUTIONS

MADE POSSIBLE BY

Stuart's

CODOL

Liquid Grinding Compound

INSURE BETTER WORKMANSHIP

Phone or write today for *Free Working Sample* and 24 page booklet describing this highly recommended modern grinding lubricant.

D. A. STUART OIL CO. Ltd.

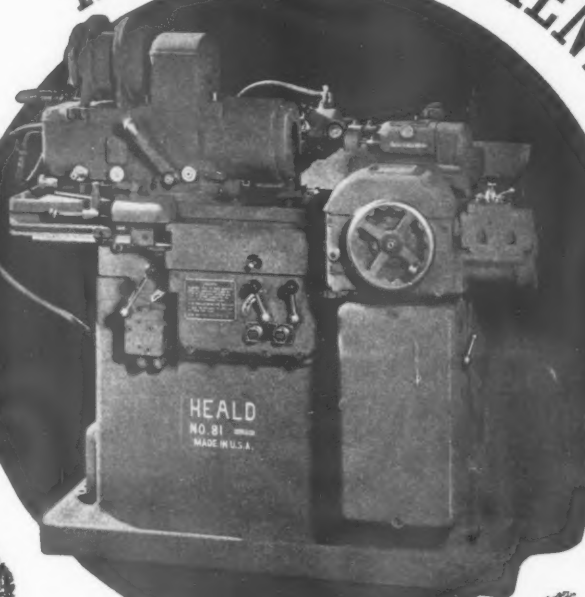
CHICAGO, U. S. A. - - - EST. 1865

Warehouses in Principal Industrial Centers

Please address request for free sample and booklet to our general offices at 2727 SOUTH TROY STREET, CHICAGO

A WISE INVESTMENT FOR 1938

1938



INTERNAL GRINDER



BORE-MATIC

Heald PRECISION FINISHING MACHINES

THE replacing of old machine tools with modern up-to-date equipment is, from all angles, unquestionably the best investment any manufacturer can make this coming year.

This is particularly true of machines required for performing finishing operations.

Heald 1938 Precision Internal Grinding Machines and Precision Boring Machines are the last word in design and construction, producing the highest precision at the lowest cost, plus increased

production, minimum scrap and ease of operation.

The Grinding Machines take care of products made of the harder materials and the Precision Boring Machines handle non-ferrous materials, cast iron and mild steel. Thus, with both grinding and precision boring machines available, we can give you **UNBIASED COUNSEL** in selecting equipment most suitable for your particular requirements.

Insure your share of business in 1938 by investigating these machines today.

THE Heald MACHINE COMPANY Worcester, Mass.

Modern Time Study

(Continued from Page 16)

Blandly drawing some pet percentage figure out of the thin air and applying it in blanket form to the total evaluated watch readings of a time study is an erroneous procedure and should be discouraged. I know of cases where it is the official practice to add two sets of figures for rest allowances; five per cent for personal necessities and another ten per cent for fatigue. This 15% is allowed for an operation regardless of its nature; the length of the working

day; or the fact that the worker, in the operation of his machine, may be idle for a good portion of the day. Also, after this blanket factor is applied, another additional figure of twenty per cent, glorified by the name of Inherent Delays, is added to the total, thereby swelling it to 35%. Just think! splitting seconds in one case to reflect watch reading postings and then destroying their value by arbitrarily adding on 35%. No wonder we have loose and tight piece work prices in industry which prompts Labor to think that wage incentive plans have much to be de-

sired. The answer is: if basic time postings are arrived at per element after meticulous care, then rest allowances and any other factors should likewise receive the same careful deliberation and be applied correctly to each element in the cycle as an individual allowance, and not in blanket form to the cycle as a whole.

Individual Effectiveness

May I again repeat one phrase I made earlier in this discussion?—modern time study measures the task to be done and then evaluates the effectiveness of the worker now doing that task. It is the job elements from which time allowances are projected; the wrong type of operator may be attempting to perform the job elements.

At the risk of mixing metaphors we can say that each operator bears his own individual trade mark and was not poured from a common mold; his mental and physical aptitudes are as distinctive as finger prints—no two are alike. Thus, in every plant we have a range of men capable of different degrees of effectiveness. They range from the green men just hired for tasks, to the elderly employees whose physical limitations prevent them from hitting the ball as hard as they formerly did. Modern time study recognizes this wide range having sub-normal extremities and prescribes symbols of performance which may be likened unto batting averages of team workers. I will come back to this point in a few moments.

Modern time study allows us to place wage incentives on inspection operations. Briefly, the plan is this: a standard time allowance is granted for the careful inspection of each good piece of work; another for each bad piece found; and a third, expressed as a percentage factor, and known as an Inspection Credit, which insures the identification of each good and bad piece of work. False rejects, when cleared through the salvage department, come back to the offending inspector and penalize him severely by means of a penalty standard.

A few years ago, one of my engineering assignments was in a high explosive plant where extreme caution in all of the processes was vitally necessary. The plant as a whole was composed of various, isolated buildings having thick, stone walls, but equipped with roofs of very light construction. The latter provided for us a quick, but rather informal exit

(Continued on Page 36)



for your
**FURTHER
MODERNIZATION**

Solid rivets are cheaper than other types. You would prefer using them because of this and stronger joint. But, there was no efficient means of setting solid rivets.

Now you can use solid rivets. You can realize savings on rivet costs. Now you can get that stronger joint—with a modern efficient machine, The RIVITOR.

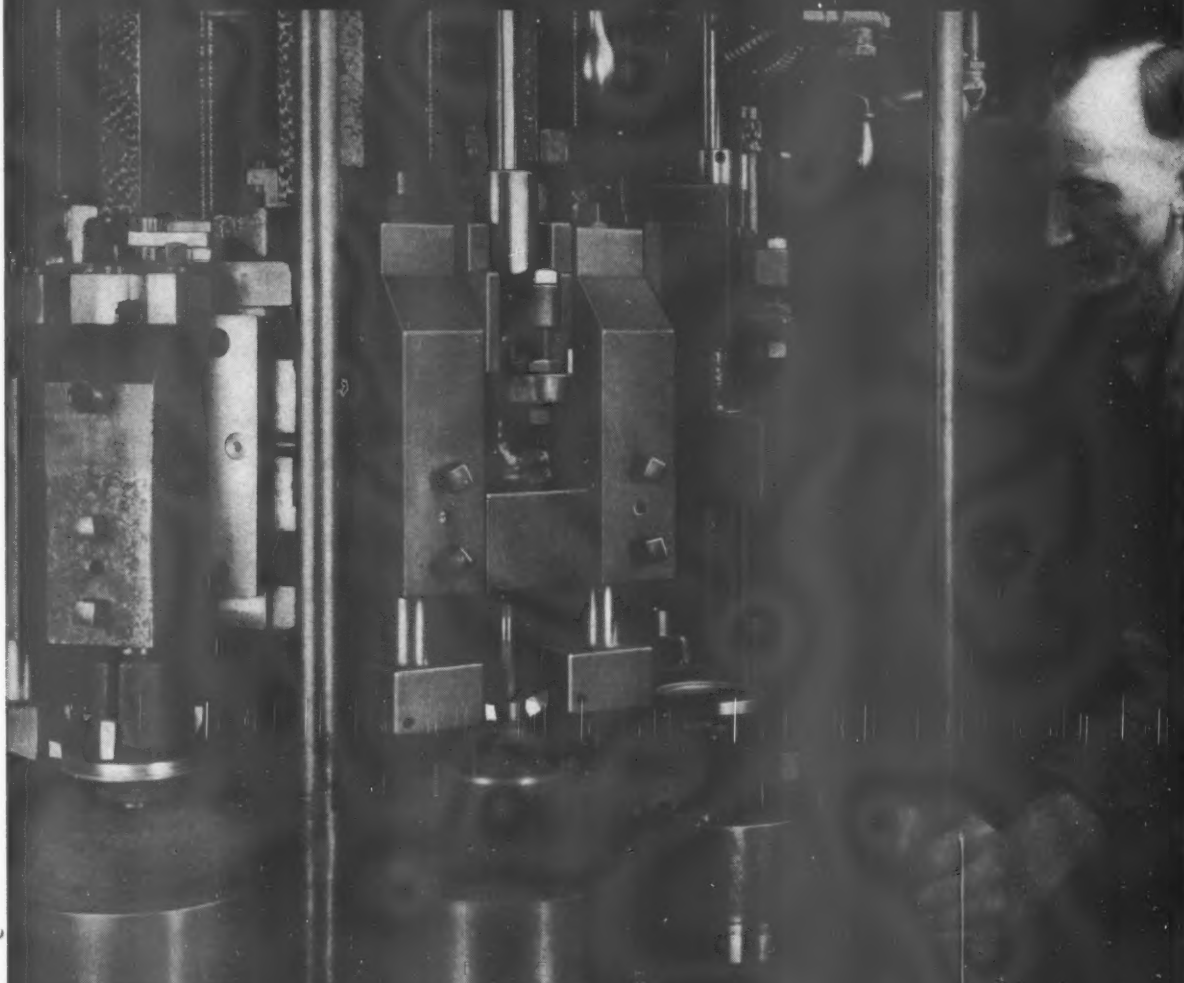
You'll do your riveting smoothly, you'll do it automatically and with precision—and you'll be doing it at rates up to 3200 rivets an hour.

Our new Bulletins BR-1 and R-3 will give you specifications.

**The
Tomkins-Johnson Co.**
624 N. Mechanic St.
Jackson, Michigan
Agents in principal cities.
Detroit Representative
HABERKORN & WOOD

RIVITOR

HERE'S NEWS



FOR the medium quantity runs, Bullard Mult-Au-Matics with standard type of tooling set high standards of Versatility and Effective Savings.

Just for instance . . . Here's an installation on which the user runs separately 9 different designs of work, each design having a run of approximately 6,000 pieces.

Times on the 9 different set-ups range from the shortest time of 13 seconds to 47 seconds the longest time.

Previous to this Mult-Au-Matic installation,

several other machines did not adequately care for the production volume.

Now . . . Type "J" Mult-Au-Matic has replaced the several machines previously used for the 9 different jobs, and additional work is already being scheduled for this one machine.

Therefore, we say, "If Others can Profit by the Mult-Au-Matic Method, so can You". Ask Bullard Engineers to outline the Mult-Au-Matic possibilities on your work, and we suggest that you send in prints or samples for time and cost estimates.

Bridgeport **THE BULLARD COMPANY** Connecticut

Modern Time Study

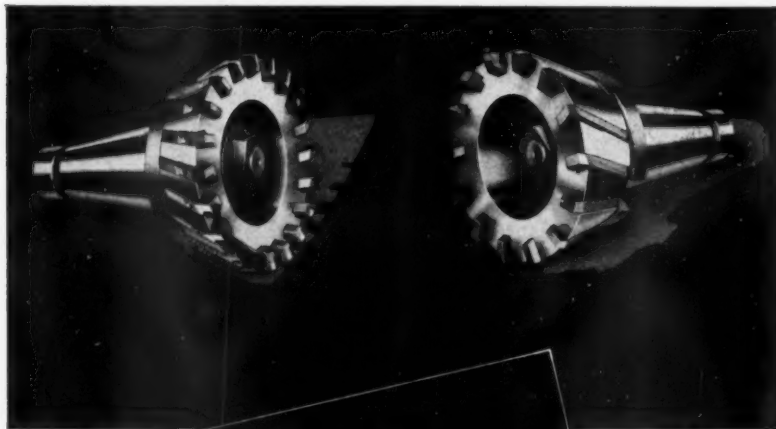
(Continued from Page 34)

—accelerated by exploded powder and T.N.T. Not only was extreme care of paramount importance in the personal conduct of each employee to preserve his own life, but his slighting of work, undue haste and other unofficial acts would cause imperfect quality of product. Improper quality would result in fatalities after the product was shipped. To prevent this, the inspection department was constantly giving vigorous attention to all operations to make sure the specifications were not violated

either as things which could be seen and measured, or the intangible items that went into the product to make it as nearly perfect as possible.

This was a severe test in applying time study methods to inspection operations, but it was successfully accomplished and resulted in more and better output with less manufacturing and personal hazards, besides the lessening of liabilities in the hands of the users of the high explosives in the field.

Editor's Note: The concluding installment of this series on "Modern Time Study" will follow in an early issue.



Less
"Down" Time

Announcing

Gair-Lock Milling Cutters and Blades, which reduce down time by making blade adjustment quick, easy and simple, and by minimizing cutter maintenance.

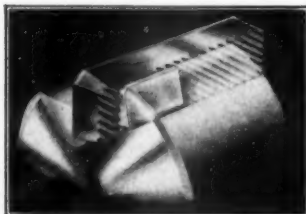
This important advance in blade design also provides greater chip clearance, increases blade life, decreases blade cost.

Write for Bulletin 104 containing full description and prices.

The Gairing Tool Co. Detroit, Mich.

MILLING CUTTERS — COUNTERBORERS — SPECIAL TOOLS

Blade GAIR-LOCKED in position in cutter head. Patent Pending



GAIRING
LOCK

MILLING CUTTERS

SHELL, SIDE, FACE, INTERLOCKING AND ALTERNATE TOOTH

Production Perspectives

(Continued from Page 19)

laid off temporarily, will be absorbed by the production increase, it was reported.

Eventually, the employees who made up the personnel of the small motors division will be absorbed by the new air-conditioning division which, it is estimated, will employ 1,000 persons next year, with an expected capacity of 3,000 to 3,500 when it really gets into full production.

Norton Co. of Worcester has received an order for 50 grinding machines from Amtorg Corp., the Russian purchasing corporation, according to George N. Jepson, vice president and general manager. The machines are the standard cylindrical grinding machines.

Completion of the new plant of the Shawinigan-Resins Corp. in Indian Orchard, originally scheduled for Dec. 15, will be delayed because of failure to receive all the necessary structural steel on time, according to President John C. Brooks. The management of the new plant, which is an affiliate of the Fiberloid Corp., hopes to see production under way soon after the first of the year.

Directors of the Van Norman Machine Tool Company of Springfield voted a common dividend of \$1 a share, payable Dec. 20 to holders of record Dec. 10. In three previous quarters, the company paid 40 cents.

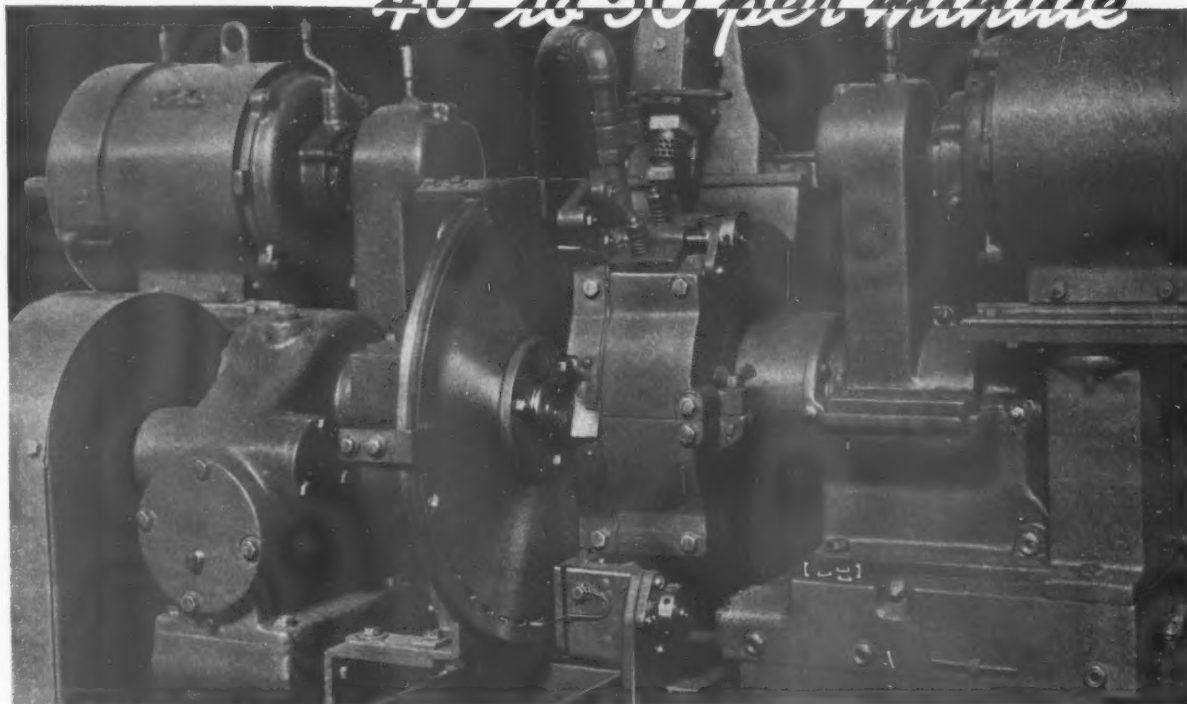
Chapman Valve Company of Springfield, has declared an extra dividend of \$1.50 a share on the common stock and the regular quarterly payment of 50 cents, both payable Dec. 15 to stock of record Dec. 8.

Employees of two Lynn plants of the General Electric Company shared in a distribution on Dec. 20 of \$3,700,000 to G. E. Workers throughout the country under the company's general profit-sharing plan for the last six months of 1937. Six thousand G. E. workers in Pittsfield will share about \$300,000.

Worcester employees of two national corporations received Christmas bonuses this year. The 360 employees of the Worcester Wire Co. will have \$10,000 distributed among them. Employees in the Worcester plant of the General Electric Co. will benefit by a bonus announced by Gerard Swope.

Christmas saving club checks totaling more than \$20,000 were distributed to several hundred employees of the F. W. Sickles Company of Springfield. The disbursements are the fruit of a plan started in January at the request of the employees.

Tiny razor parts are ground at
40 to 50 per minute



on this LATE MODEL
GARDNER
NO. 77A—12"
DOUBLE GRINDER

A NEW-MODEL 12" Double Spindle Gardner Grinder is the latest addition to this popular line of tools.

It is adapted to a host of small flat surface parts, like the tiny filler blocks for inner and outer blades of a well-known "dry shaver", seen here.

These parts are ground with a rotary work carrier, loaded by hand, but with a spring "kick-out", at the rate of 40 to 50 per minute. Stock removal averages .004" to .006", and limits of .001" for parallelism and uniformity, are maintained.



*This NEW Grinder is
ideal for your small
parallel-surface
parts—*

WRITE US FOR FULL DETAILS!

GARDNER MACHINE COMPANY

442 East Gardner Street Beloit, Wisconsin, U. S. A.

New Literature

of Interest to the Tool Engineer

"The Contour Machining Handbook," the new title of the revised and enlarged edition of the earlier handbook on contour sawing, adequately describes the wide subjects covered by this new 106 page book. Tables for the correct machining speeds for either sawing or filing 48 materials are given. These materials

range from plastics to SAE 1090 and high chrome high carbon steel. Other new subjects covered in this handbook are the elimination of machining strains by correct sawing technique, the wider infinitely variable speed range now possible, the simple butt welding of the precision narrow saws as accomplished for internal cutting and additional illustrations and case records dealing with unusual contour machining jobs. This Handbook is offered free and may be secured by application to Continental Machine Specialties,

Inc., 1301 Washington Avenue South, Minneapolis, Minnesota.

▼ ▼ ▼

"Machining Aluminum" is the title of a completely revised edition of a booklet containing detailed data on the machining of aluminum and its alloys. The booklet, we judge, is of high value to readers of "The Tool Engineer," and is available to them free of charge when they mention this publication and address their requests to The Aluminum Company of America, Pittsburgh, Pa.

▼ ▼ ▼

Proconier Safety Chuck Company, 18 South Clinton Street, Chicago, Illinois, have issued a new bulletin 8½ x 11 describing "The Proconier Universal Tapping Machine." Complete descriptions with illustrations and detailed specifications are given along with descriptions of the Proconier Sensitive High Speed Tap Heads, "Tru-Grip" Tap Holders, and other models of Proconier tapping machines. One page is devoted to "Short Cuts in External Threading of Brass, Die Castings, and Aluminum."

▼ ▼ ▼

A new bulletin has also been issued by the company describing "The New Proconier Drill Press Tapping Attachment. This is the new sensitive High Speed Tapping Attachment and a constructional diagram, illustrations, specifications, etc., are given.

▼ ▼ ▼

New bulletins have been issued describing "Rex-Tube Metal Oil Rose" and "Rex-Wald and Rex-Tube Insulated Steam Hose." These bulletins, as the titles suggest, describe the products of the Chicago Metal Hose Corporation, Maywood, Illinois. Copies will be sent free on request by mentioning bulletin T-E and addressing requests to the company.

▼ ▼ ▼

One of the most unique, unusual and artistic catalogs to come to our attention is that of the R. K. LeBlond Machine Tool Company, Cincinnati, Ohio, which is entitled "What Makes Main Street?" The first several pages of this novel presentation of a machine tool describe in full colors the typical main street, its homes, the commodities purchased, the manufacturers of these commodities, the plant, the tooling, the importance of the lathe, "The Prime Machine," the features of the lathe, and finally the LeBlond Plant, etc. Left-hand pages are full page

INSIDE FACTS

Simple,
Positive Controls
for All Hydraulic
Applications.

Balanced
Pistons — Easy
Operation Under
All Conditions
and Pressures.

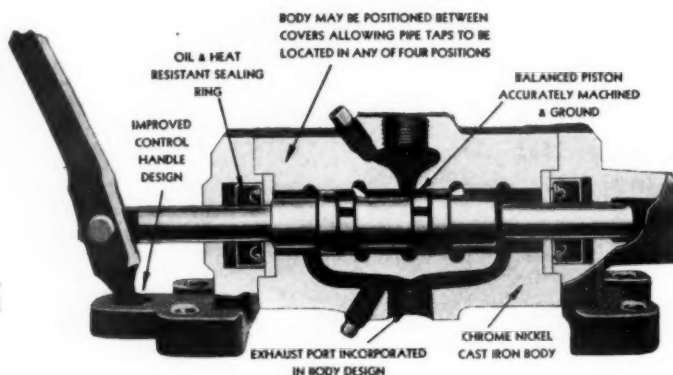
"Logan" Hydraulic Valves are designed and constructed for positive accuracy of control, maximum ease of installation and operation, and thorough dependability.

The standard "Logan" Line includes hand, foot, solenoid, cam, pilot and latch operated control valves; relief, by-pass, pressure regulating and speed control valves. Standard "Logan" Valves can be employed in a wide variety of combinations for manual, semi-automatic or fully automatic control on any type of hydraulic power operation.

"Logan" Field Representatives and "Logan" Engineers will be glad to make recommendations on your own requirements. Catalog and complete information will be mailed on request.

Universal
Mounting Feature
Reduces Piping,
Simplifies
Installation.

Adaptable
for Manual, Semi-
Automatic or Full
Automatic
Operation.



LOGANSPORT MACHINE INC., LOGANSPORT, IND.

Manufacturers of Air and Hydraulic Devices, Valves, Cylinders, Chucks, Presses and Accessories; and "Logan" Sure Flow Centrifugal Pumps.

FOR *Quick* ADJUSTMENTS!

USE SCULLY-JONES
ADJUSTABLE ADAPTERS

and

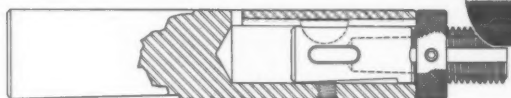
ADJUSTABLE EXTENSION
ADAPTERS



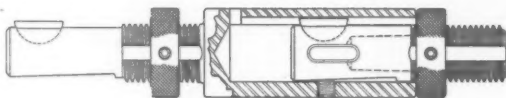
STYLE "A"



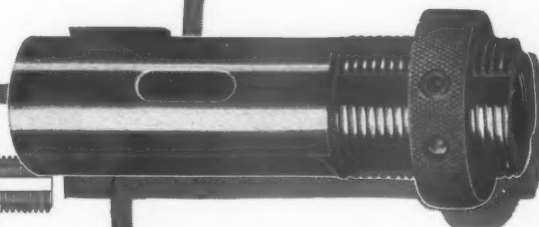
STYLE "B"



STYLE "C"



STYLE "D"



The use of Adjustable Adapters permits a quick and easy adjustment of tools, in multiple spindle work, without disturbing the entire set-up . . .

To lengthen or shorten assemblies, simply release the set screws in the nut and body, then turn the knurled nut to secure the correct adjustment.

So general has become the use of these adapters that many tools are now being made with this type of shank . . . Where additional adjustment is needed, it is common practice to use Style "D" having an adjustable adapter shank on the extension.

All standard sizes carried in stock. Special sizes made upon request.

FOR PRICES—SIZES AND
FURTHER INFORMATION
WRITE US

SCULLY-JONES & COMPANY

1903 S. ROCKWELL ST.

CHICAGO, ILLINOIS

MANUFACTURERS OF QUALITY PRODUCTION TOOLS

illustrations showing the LeBlond Lathes, detailed views of certain outstanding mechanical features; while on right-hand pages are given concise, easy to read, descriptions of the subjects depicted.

Readers of "The Tool Engineer," mentioning this publication, addressing their requests for this catalog on their company letterhead, may receive a copy although the edition has been limited.

Landis Tool Company, Waynesboro, Pa., have issued a new catalog

8½ x 11 and No. T.E.—K 137, which describes the Landis 12" x 28" Universal and Tool Grinder. This is a new, profusely illustrated issue which will be of interest to the practical manufacturing executive. A copy may be had by addressing the company direct specifying the above catalog number.

Hobart Brothers, Troy, Ohio, announce a new catalog on the "New 40 Volt Simplified Arc Welder." This attractive bulletin, 8½ x 11 has 28 pages, profusely illustrated describ-

ing this new simplified Arc Welder equipment. In requesting it address the company direct mentioning Catalog No. T.E.

National Twist Drill and Tool Company, Detroit, Michigan, have issued a new catalog describing their new "Spline-Taper Drive Heavy Duty Counterboring Tools" and "Spline Drive Inverted Spot Facers." This is an attractive catalog on these new products of the company containing many illustrations with various sizes and prices given, also with detailed facts of construction and other engineering data. Mention catalog TE when writing for your copy.

A free copy of a new booklet describing "Soluble Cutting Oil" and containing much useful information to metal working concerns using this type of lubricant is available to readers of "The Tool Engineer." This booklet is issued by the D. A. Stuart Company, Ltd., 2727 South Troy Street, Chicago, Ill.

One of the most complete and comprehensive catalogs of modern chucking equipment has been issued by The Cushman Chuck Company, Hartford, Conn. An entirely new and important feature of this new catalog is the inclusion of large scale blueprints and full dimension data for all chucks and component parts, which should prove especially valuable to Tool Designers and engineering departments. In writing for your copy mention "The Tool Engineer."

A new folder issued by the Standard Pressed Steel Company, Box 100, Jenkintown, Pa., has just been received which describes a new "Self-Locking Hollow Set Screw." Copies may be had by addressing the company direct at the above address.

A new pamphlet illustrating and describing a "Spot Facing Machine and a Metal Spinning Machine" completely powered with and controlled by Logan Hydraulic devices is available to readers of this publication. Both of these machines exemplify unusual use of hydraulic equipment. Mention "The Tool Engineer" when addressing your request to Logansport Machine, Inc., Logansport, Indiana.

PRECISION PAYS



YOU CAN CHARGE ONE "LOW COST" MISTAKE TO EXPERIENCE

DANLY DIE SETS AND DIE MAKERS' SUPPLIES

From the 8 Danly Branch Office Stocks

BRANCHES:

LONG ISLAND CITY, N. Y.
36-12 34th STREET
DETROIT, MICHIGAN
1549 TEMPLE AVENUE
CLEVELAND, OHIO
1745 ROCKWELL AVENUE
DAYTON, OHIO
990 E. MONUMENT AVENUE
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3913 N. BROAD STREET
ROCHESTER, N. Y.
16 COMMERCIAL STREET
MILWAUKEE, WIS.
513 EAST BUFFALO STREET

Saving in the cost of die sets is one of the most expensive forms of tool room economy. Just a few more thousand pieces per regrinding more than pays for the extra value of the Precision Set. The cost of one production line tie-up, one die smashed would make up for a "precision appropriation" for an industrial lifetime.

Precision Pays. Shearing is the continual destroyer of die surfaces—offset it with the $\pm 1/10,000$ " accuracy of Danly Precision Die Sets.

Precision Pays. Specify Danly Precision Die Sets and you have it.

DANLY MACHINE SPECIALTIES, Inc., 2114 So. 52nd Ave., Chicago, Ill.

DANLY PRECISION DIE SETS

Sundstrand Products

Illustrated are typical standard Stub Lathes, Rigidmils, and other Sundstrand Machine Tools. These are available in other sizes and types, as indicated; in semi-standard or special designs as may be required. An outstanding characteristic of all Sundstrand Machine Tools is the simplicity and excellence of the basic designs which lend themselves readily to special applications most economically.

Our American Broach and Machine Division builds Broaching Machines, Fixtures, and Broaching Tools for any practical broaching operation.

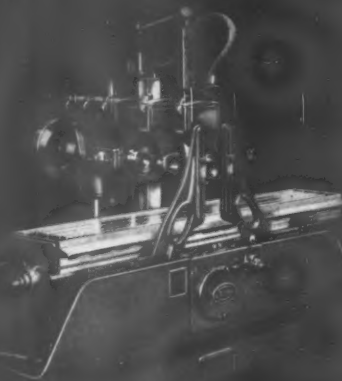
Our Pump Division designs and builds the Sundstrand Hydraulic Pumps, Fluid Motors, Valves and Controls which are operating with notable success in our own and other machine tools.

Sundstrand engineers are expert in developing effective applications of our products and in designing fixtures for accurate work-holding and high production. Our local representatives will cooperate with interested manufacturing executives to compile and transmit accurate data on which our engineers will prepare reliable cost and production estimates.

Rigidmils



No. 2 Electromil, shown at left, has automatic electric table control; is unexcelled for high speed milling on parts for business machines, household appliances, and the like. Smaller Rigidmils with Sundstrand Hydraulic Equipment, will soon be available. Larger sizes are mentioned below.



No. 3-C Rigidmil, shown at left, is slightly larger than No. 3-A and smaller than No. 4. All these are available with reciprocating or rotary tables, vertical or horizontal spindles, several different standard lengths, feed combinations, and spindle speed ranges; practically unlimited special applications.

Drilling and Centering Machines



No. 56, at left, operates on one or both ends of work simultaneously or independently to drill, ream, countersink, spotface, etc. Versatile, efficient, economical.

Stub Lathes



Models 8 and 10 are typified by illustration above. Accurate, simple, durable. Automatic operating cycle includes rapid traverses of 250" a minute. Easily set up, no special cams or parts necessary. Hardened steel ways, complete lubrication, and other features insure long life. Lengths, speeds, and feeds, available for wide variety of work.



Tool Grinders

Two-wheel type shown at left. For accurate, rapid, economical grinding of single-point cemented carbide and other cutting tools. Three-wheel type also available.



SUNDSTRAND MACHINE TOOL CO.

2532 Eleventh Street

Rockford, Illinois, U. S. A.

Handy Andy's Workshop

(Continued from Page 22)

advertise. Right now, prospective buyers have a little time for reading and consideration, and somehow, the really good things stick in the mind, to click when the time comes. Goods that are consistently advertised move, besides, good advertising gets people prosperity minded.

The A.S.T.E. is doing its share toward the upswing by staging a tool show — a Machine & Tool Progress

Exhibition, if you please — to be held in Detroit next March. An ambitious program, perhaps, but then, this is a live and ambitious organization with the matured guidance of experienced officers and the verve and spirit of Youth. That combination will put a good thing across.

No industrial show was ever projected at a more opportune moment, for the time — March — is admirably calculated to give impetus to the upswing. And, the locale is ideal, for since we look to the automotive in-

dustry to take the lead, the automobile center of the world — Detroit — is the logical setting for a Prosperity Tool & Machine Exhibition. Then, too, the location for the show is excellent. Convention Hall is accessible from all parts of the city, is handy to the hotels, affords conveniences. The show will be the talk of the country.

▼ ▼ ▼

Well, the Show is started, equipment makers and sales agencies are reserving space. It is now up to you boys who make Tools, Machinery, Equipment to get behind it and exhibit. And don't make the mistake of thinking that this Show is just going to be a local affair. Not by a darn sight! Chapters North, East, West, South are planning excursions; all roads lead to Detroit March 9th, 10th, 11th & 12th, '38. There will be buyers aplenty among those excursionists, let alone a host from the Detroit area. You be there at the Exposition, showing your stuff.

▼ ▼ ▼

There's a job cut out for you A.S.T.E.ers, too. From now until the show you've got to think, eat and live The A.S.T.E. Machine & Tool Prosperity Exposition. You can't leave it all to the officers and committees; every man Jack among us will have to elect himself a Committee of One to make this Show the biggest success ever. It can be done. Get behind us, and we'll show the world what makes this American Society of Tool Engineers set the pace. Ambition, Spirit, Teamwork, Enthusiasm — these are the qualities that have made this Society the fastest growing and most progressive engineering association on earth. Together they make A.S.T.E. Now, let's go!

And now, let us mutually wish each other a Happy and a Prosperous New Year, let us cooperate to make this a fact, not a mere wish. We can do it.

H. A.

Men and Materials

(Continued from Page 32)

management agreed, the best solution of the problem of materials handling is to turn it over to a reputable maker of conveying equipment. Mass production has become a specialty, so has the building of conveyors and the equipment to move goods.



15"x6" South Bend Quick Change Gear Underneath Belt Motor Driven Precision Lathe on a manufacturing operation.

POWER and rigidity in production, accuracy and precision in tool and gauge work, and versatility in many different operations are characteristics required of the new 15-inch South Bend Series "T" lathe in hundreds of manufacturing plants, tool rooms, and machine shops. The fine workmanship, design, and new features of this lathe, combined with its smooth, quiet operation, assure quick and accurate handling of machining operations to the most exacting specifications.

68 Sizes and Types of Lathes for every purpose.

- 9" lathe prices start at \$85
- 11" lathe prices start at \$371
- 13" lathe prices start at \$448
- 15" lathe prices start at \$544
- 16" lathe prices start at \$642



Write FOR BULLETIN

Bulletin No. 15-C illustrates, describes and prices the different models of the 15-inch lathe. Copy sent free, upon request.

SOUTH BEND LATHE WORKS

928 East Madison Street, South Bend, Indiana, U.S.A.

SOUTH BEND Precision LATHES
MODERN LATHES FOR MODERN INDUSTRY

For Greater Production Achievement

Barber-Colman Offers

A Complete Hobbing Service—

MACHINES—Six standard sizes and types ranging in capacity from 1" diameter by $\frac{1}{2}$ " face to 12" diameter by 12" face. Special machines built to order.

HOBS—Ground hobs for highest accuracy, production, value. Unground hobs for ordinary commercial accuracy, lowest first cost.

HOB SHARPENING MACHINES—Made in 2 sizes, both automatic. Grind accurately any make of straight- or helical-gashed hob with radial tooth-faces equally spaced.

SERVICES—Expert specialists for consultation on your hobbing problems, trained operators to demonstrate Barber-Colman Hobbing Machine installations and inspect them for you periodically thereafter.

Milling Cutters—Back of Barber-Colman Cutters are the same experience and facilities that have made Barber-Colman Hobs pre-eminent. Skillful cutter designers are available for cooperation in solving cutter problems.

Reamers—Barber-Colman Reamers are distinctive in design, highly successful in operation. Their cutting edges are finished on the Barber-Colman Reamer Sharpening Machine—an exclusive feature which has many advantages.

Reamer Sharpening Machines—The Reamer Sharpening Machine creates the unique cutting edge and extremely high accuracy which distinguish Barber-Colman Reamers, recreates these qualities when purchased for servicing Barber-Colman Reamers used in high-production manufacturing.

• Barber-Colman products have participated in many notable metal working achievements in the past, will continue to progress with industry in the future. Inquiries invited, engineering cooperation always available for new applications of standard or special Barber-Colman products.



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MILLING CUTTERS,
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Chapter Doings

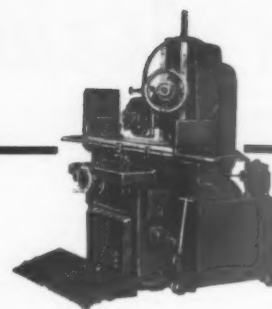
(Continued from Page 21)

cerned, leaving each applicant to decide for himself whether he wished to be attached to this chapter, to the Bridgeport one or the contemplated Philadelphia chapter.

At the December 14 meeting, held at the Robert Treat Hotel, Newark, N. J., Chairman Frank Scheeley presided and his first job was to introduce newly appointed committee chairmen. Bill Dinger of Pratt & Whitney is chairman of the membership committee and he reported that the membership of the chapter numbered 58, with 12 applications at Detroit awaiting action and 10 applications received that night. Tom Orchard of the Wright Aeronautical Corp. is chairman of the entertainment committee, while John Cetrule, manager of the Triplex Machine Tool Co., heads the meetings committee. Frank Oliver is chairman of the publicity and editorial committees.

Mr. Cetrule introduced the speaker of the evening, Fred W. Shumard, President of the National School of Time Study, who repeated the talk on "Modern Time Study" he had given before the Bridgeport

(Continued on Page 48)



This No. 35 Grand Rapids Hydraulic Feed Surface Grinder is ideal tool room equipment where accuracy and fine finish are required.

You owe it to yourself and your associates to get our catalog now.

Gallmeyer & Livingston Co.

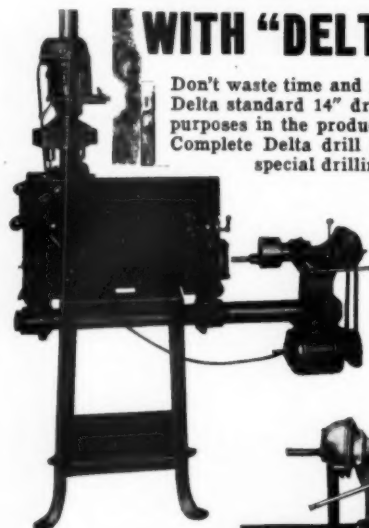
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GRAND RAPIDS, MICH.

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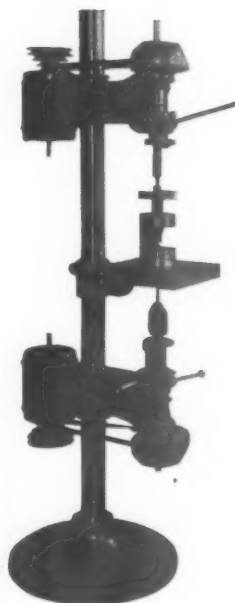
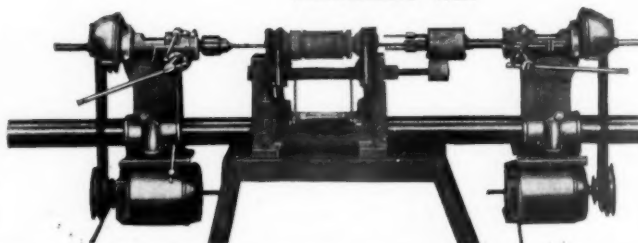
Don't waste time and money building drilling units for special operations. Delta standard 14" drill press heads can be used for hundreds of special purposes in the production shop, such as those shown in the illustrations. Complete Delta drill presses, too, are priced low enough to be used for special drilling operations, rigged up as single-purpose machines and stored in the toolroom when not in use on the line. Alert and progressive tool designers are finding more uses every day for these high-grade, self-sealed ball bearing heads and drills. Send for literature completely describing Delta Drill Presses.

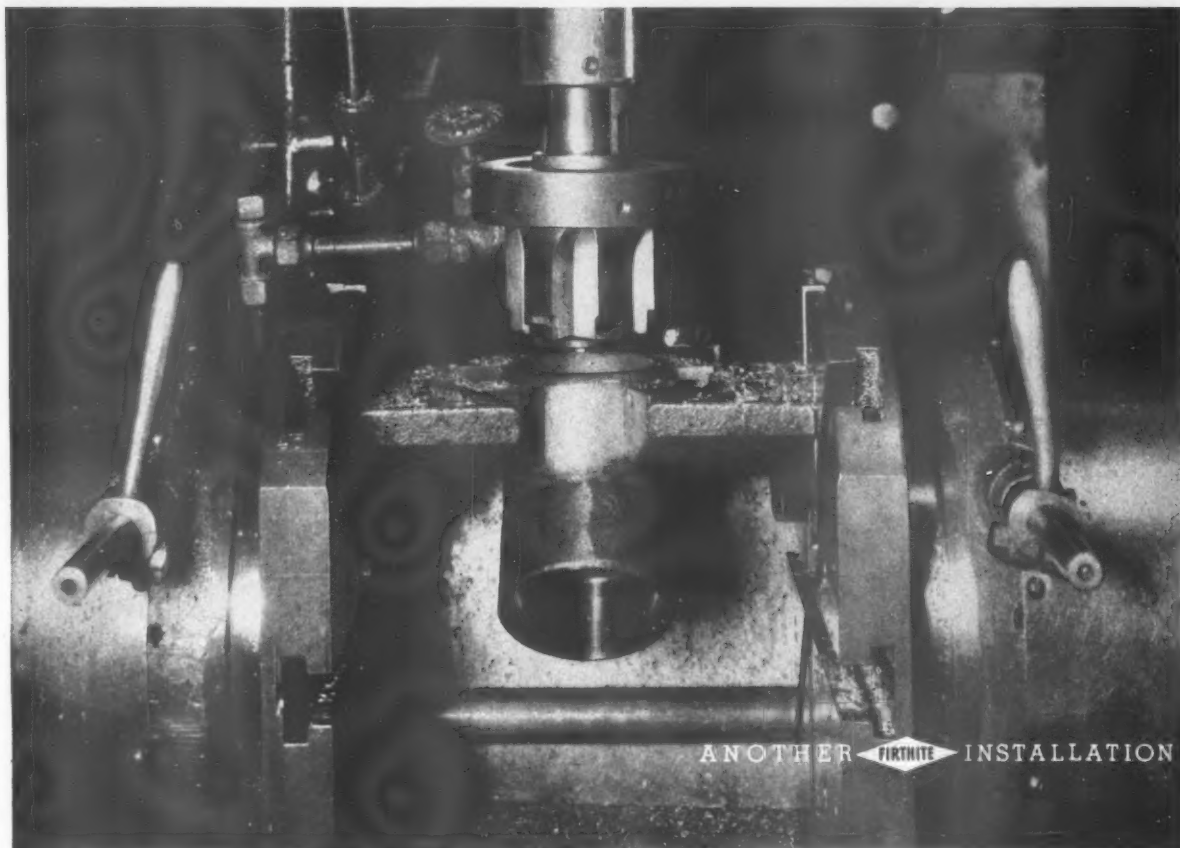
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Note that we furnish only standard drill presses and drill press heads. We do not build special machines.





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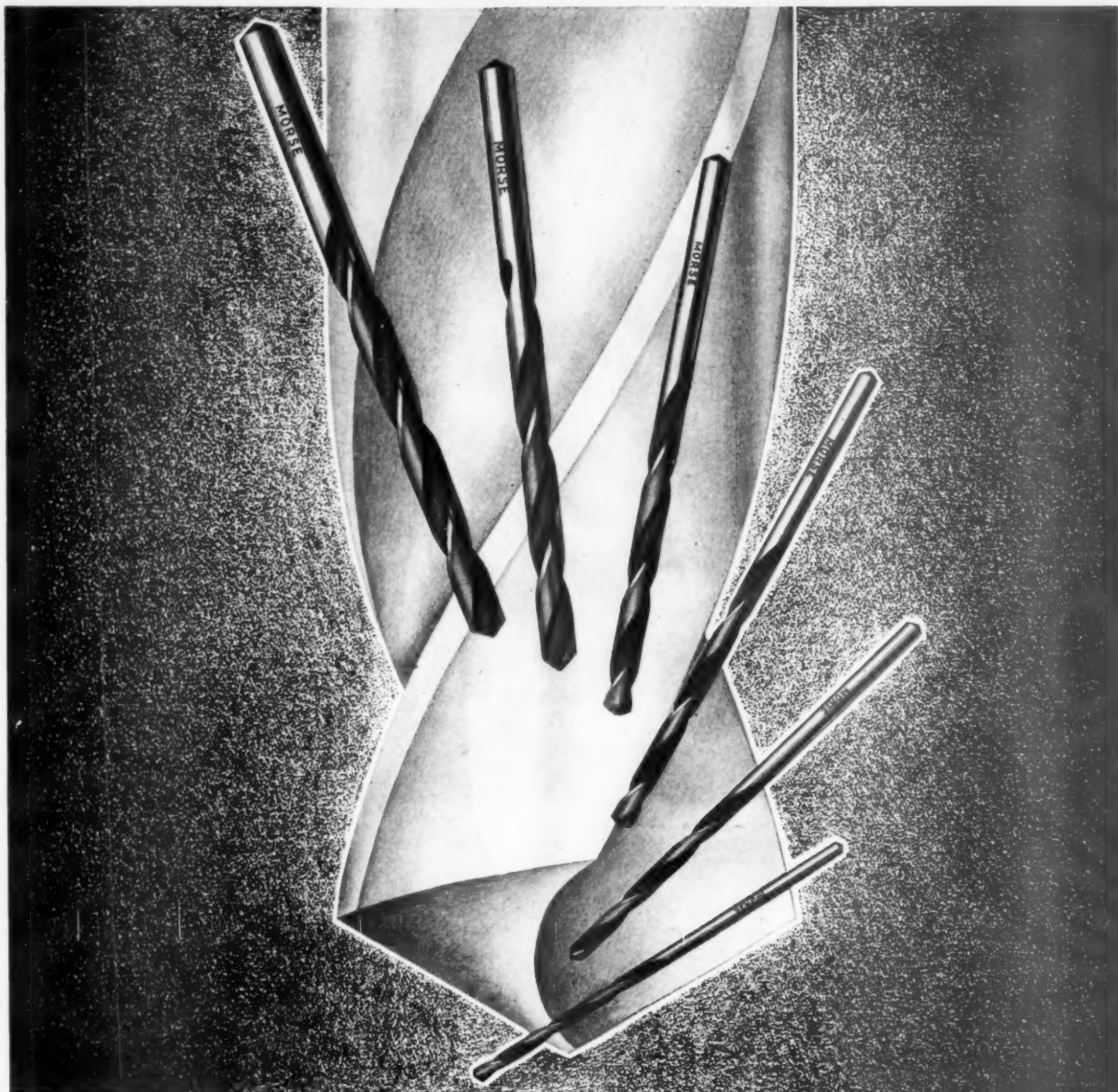
This boring is done at:
 Speed of 400 feet per minute.
 Production 5000 pieces per grind.
 80,000 pieces per tool life.

This FIRTHITE Tool set-up is just one of many hundreds of Profit making FIRTHITE installations. Consult us for specific information on possible FIRTHITE applications in your shop.

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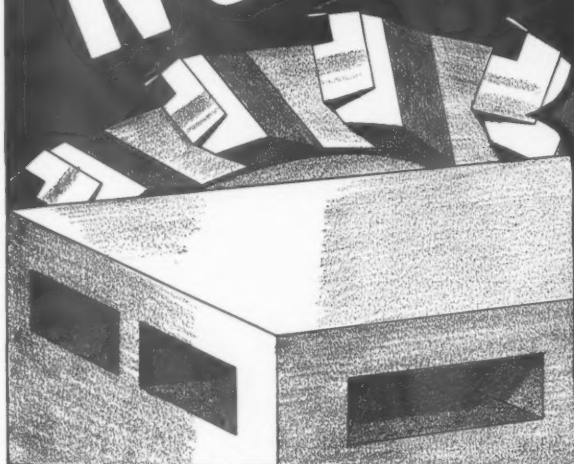
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WELL KNOWN
MILLING CUTTERS
with
CARBOLOY
TIPPED BLADES
at these
STANDARD PRICES

NOW—you can get any one of the 8 well-known milling cutters listed above, complete with Carboloy blades, at the low standard prices shown.

All of these eight progressive manufacturers have co-operated to make available to you a standard line of Carboloy-tipped milling cutters, for a wide range of use, at the lowest possible price. When you use any one of these eight styles of cutters you get a cutter suitable for more than 75 per cent of all face milling operations on cast iron, non-ferrous metals and non-metallic materials, greater flexibility of use, faster deliveries of standard replacement blades, PLUS all the well-known advantages of Carboloy cemented carbide.

Start at once to get the greater savings and greater convenience of use now possible. Send for new catalog containing complete listing of prices and specifications.

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PITTSBURGH • STAMFORD, CONN. • WORCESTER, MASS.
Canadian Distributor: Canadian General Electric Company, Ltd., Toronto

CUTTER DIA.	NO. OF CARBOLOY BLADES	CARBOLOY TIP SIZE	COMPLETE CUTTER PRICE
3	8	$\frac{3}{8} \times \frac{1}{4} \times \frac{5}{16}$	\$59.52
4	8	$\frac{3}{8} \times \frac{5}{16} \times \frac{3}{8}$	67.10
5	10	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	85.00
6	12	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	102.00
7	16	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	130.00
8	18	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	147.00
9	20	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	166.00
10	22	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	185.00
11	24	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	204.00
12	26	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	223.00
14	30	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	269.00
16	34	$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	315.00
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Prices on larger quantities
on request.

Save From 15% Up In Cost of Carboloy

The new Standard-size Carboloy tips recently announced are used in all of these milling cutters. That means a saving of at least 15 per cent in the cost of the Carboloy in each cutter!

Send
FOR
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REG. U. S. PAT. OFF.
CEMENTED CARBIDE TOOLS

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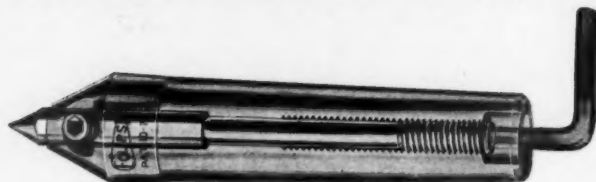
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Name..... Title.....
Company.....
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**Adjustable
Interchangeable
Long-lived . . .**



HIGH SPEED STEEL INSERT CENTERS



*Phantom View of the Eclipse
High Speed Steel Insert Center*



ECLIPSE CENTERS! for ECONOMY!

Tips Adjustable for length, can be reground for the major portion of their length—Resulting in Economy.

Replaceable Tips—the part that wears the most can be replaced after the repeated grindings have finally used up the old one. Holder still remains—Resulting in Economy.

Tips made of High Speed Steel, properly hardened by Eclipse's own heat-treating experts, resist burning, roughing, and wear—Resulting in Economy.

The Eclipse interchangeable principle again obsoletes older types of solid centers and gives Industry another long-life Economical tool.

Adjustable Insert Centers are available from stock in popular taper shank sizes, with special lengths or tapers, on prompt delivery.

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ECLIPSE COUNTERBORE COMPANY
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Chapter Doings

(Continued from Page 44)

Chapter a few months ago. A number of time study men from some of the leading plants, were present and they spared no one's feelings in pointing out some of the shortcomings of Tool Engineers as far as their knowledge of time study was concerned. All agreed that a knowledge of motion study would be of great help to a tool designer.

The officers were well pleased at the turnout, since 94 had sat down to dinner and 100 more had come in for the meeting that followed. Many of the guests present signified their interest in becoming members.

ROCHESTER — NEXT?

Unusual interest has been shown by Rochester, New York, Tool Engineers toward establishing a chapter of the American Society of Tool Engineers in Rochester.

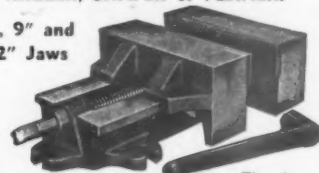
One or two get together meetings have been held and it was reported that they would apply for a charter some time in January.

The committee headed by John S. Bartek, 170 Merwin Avenue, would be glad to hear from Tool Engineers of the Rochester area who are interested in affiliating with this new chapter.

WISE For Drill Press

With and Without Jig Attachments
Often used on
MILLER, SHAPER or PLANER.

6", 9" and
12" Jaws

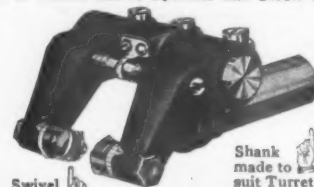


Attachments mean much drilling — small Jig cost.

Fig. 2
Without Jig
Attachments

—KNURL— HOLDER

For Turret Lathe. Operates like Screw Die



Swivel
Lugs

Shank
made to
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Adjustable to any size within its capacity.
Straight Cut Knurls in Swivel Lugs Produce all Standard Styles of Knurling.

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World's Most Modern Tool Plant



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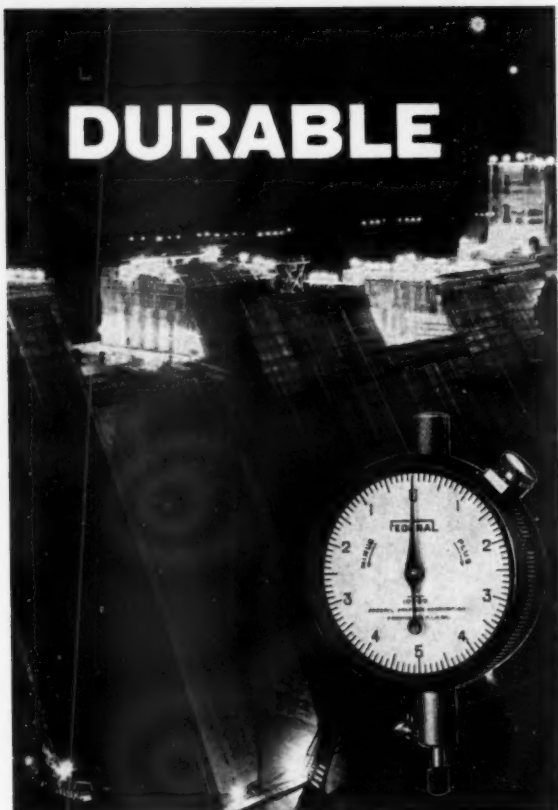
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This is the slogan adopted by a group of A.S.T.E. Members who meet every Tuesday Night at 8:00 P.M. in the offices of the Society at 5928 Second Blvd. for the purpose of learning to express their thoughts in an intelligent manner while on their feet.

They are guided in these efforts by a man who, by virtue of his experiences as a platform speaker and Chautauqua Lecturer, is perfectly capable of handling such a job. He has in the past moulded out of a bunch of shy and tongue-bound fellows a group of speakers whose words are attentively listened to whenever they are heard.

We have just concluded our Fall Session with a very successful meeting in the offices of the Pioneer Mfg. & Engineering Company, to which company we are greatly indebted.

A Spring Term will start on Tuesday, February 8, 1938, at 8:00 P.M. at 5928 Second Blvd. Everybody interested is asked to be there. The first regular meeting will be one week from that date, and there will be ten regular meetings.

So, if you wish to get on your feet—join the Speakers Club.



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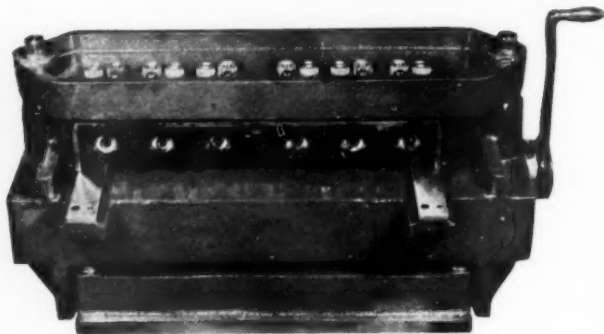
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Drill and ream 12 valve stem guide holes, cylinder head. As both exhaust and intake valve seats are angular to face, fixture is trunnion type; thus, both angles are secured without removal of part from fixture. Complete production line of 6 fixtures for drilling, reaming, chamfering, etc., all holes. Designed and built by Q-C.

Regardless of Quantity or Type of Parts you machine in your plant, Q-C will prove a Time and Money Saver. Send for data, or mail us part prints.

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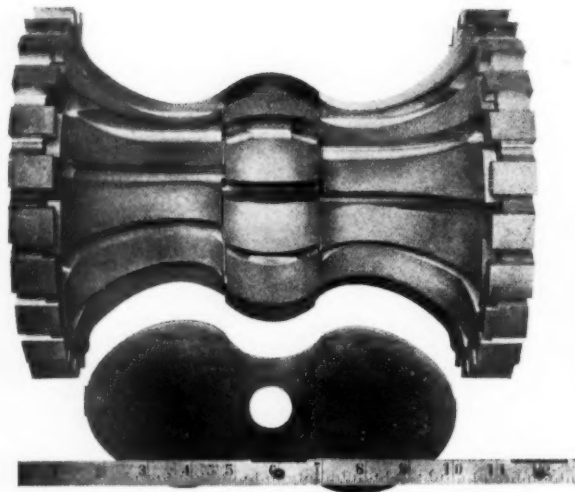
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Rugged construction, substantial long-lived blades, and easy adjustment distinguish the Type No. 7 Wetmore Adjustable Shell Reamer . . . another of the famous line of Wetmore Reamers, built to Wetmore precision standards. Write for Catalog No. 36.

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Designers and tool engineers are invited to avail themselves of our consulting service on all reaming operations—standard or special tools to decrease your manufacturing costs.

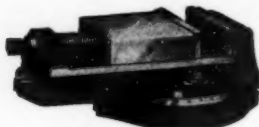


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12 Sizes
From 3/4 to 10 ton
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4 Sizes
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Drill Press Vises
3 Sizes
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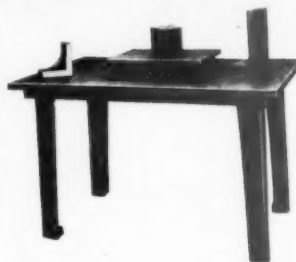
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1" table edge facilitates
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Approx.
Wgt.
1000 lbs.
100 lbs.
25 lbs.
35 lbs.
35 lbs.

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As far ahead of others in its field and capacity
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For a thousand and
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Designed for the utmost ease
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stages of power
with maximum
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An outstanding performer. The only hand
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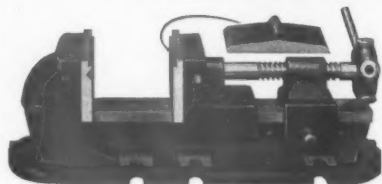


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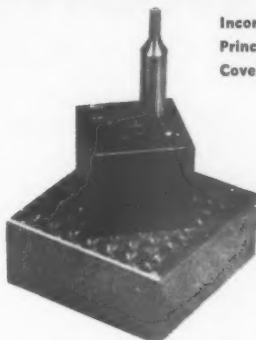
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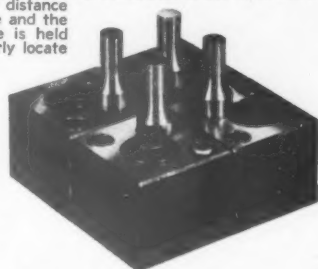
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Fig. 232



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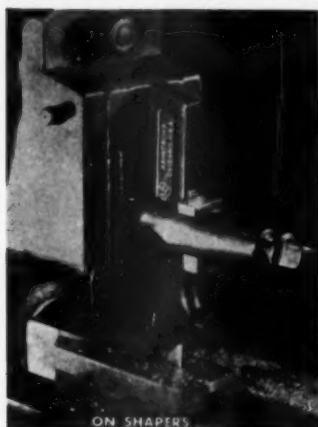
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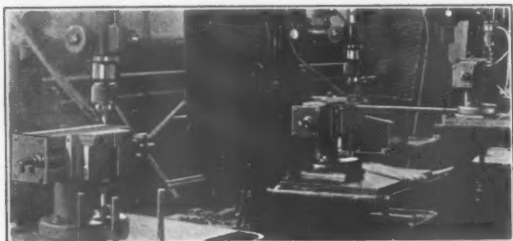
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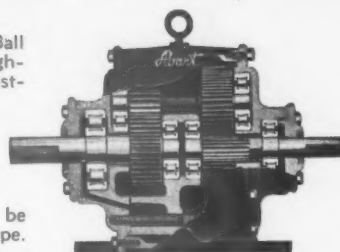
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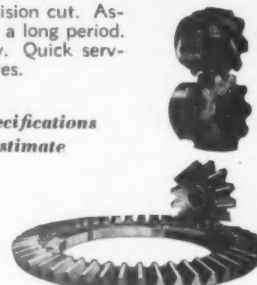


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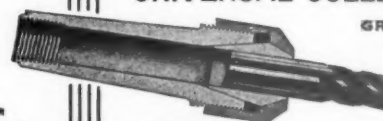
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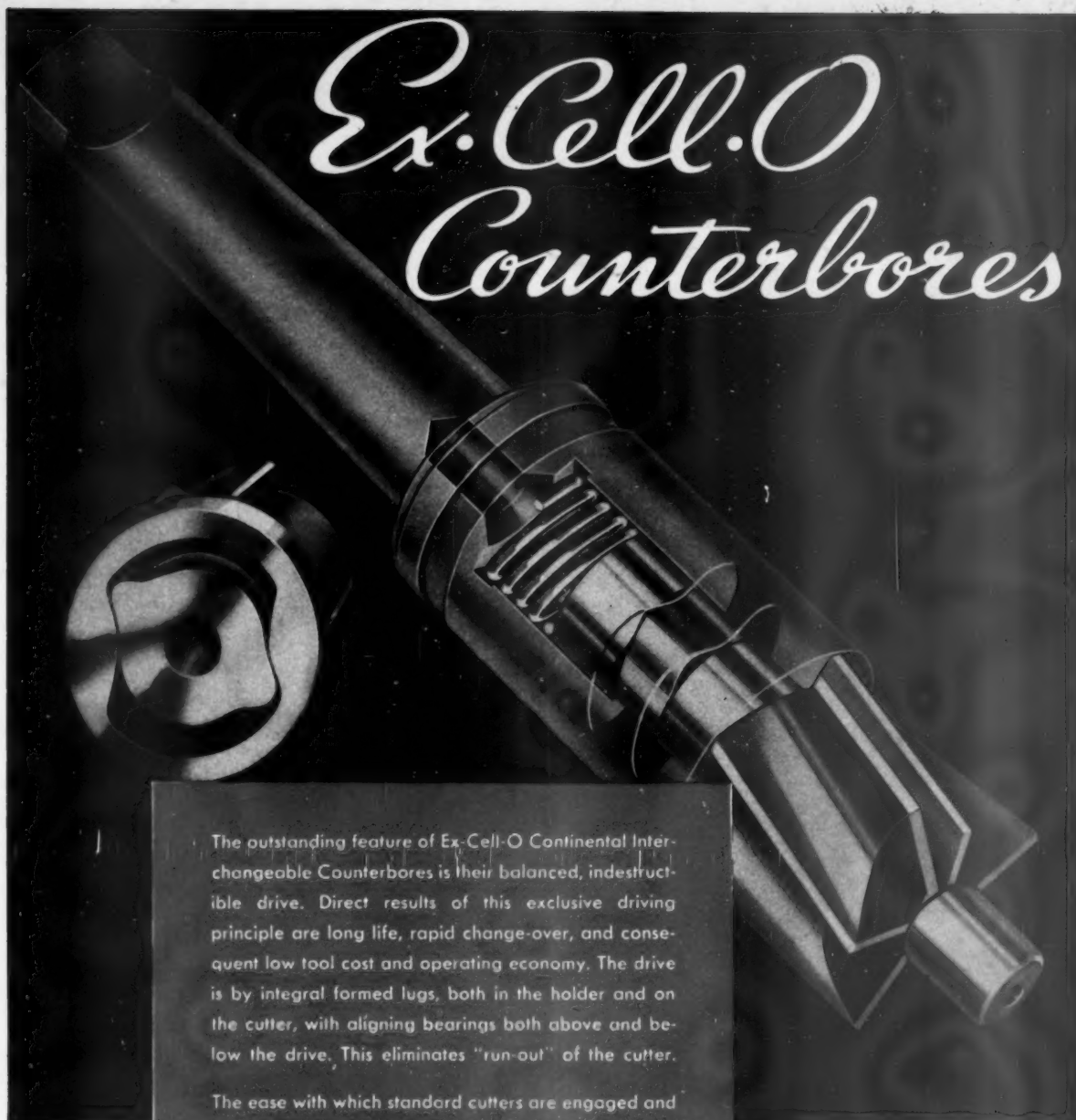
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